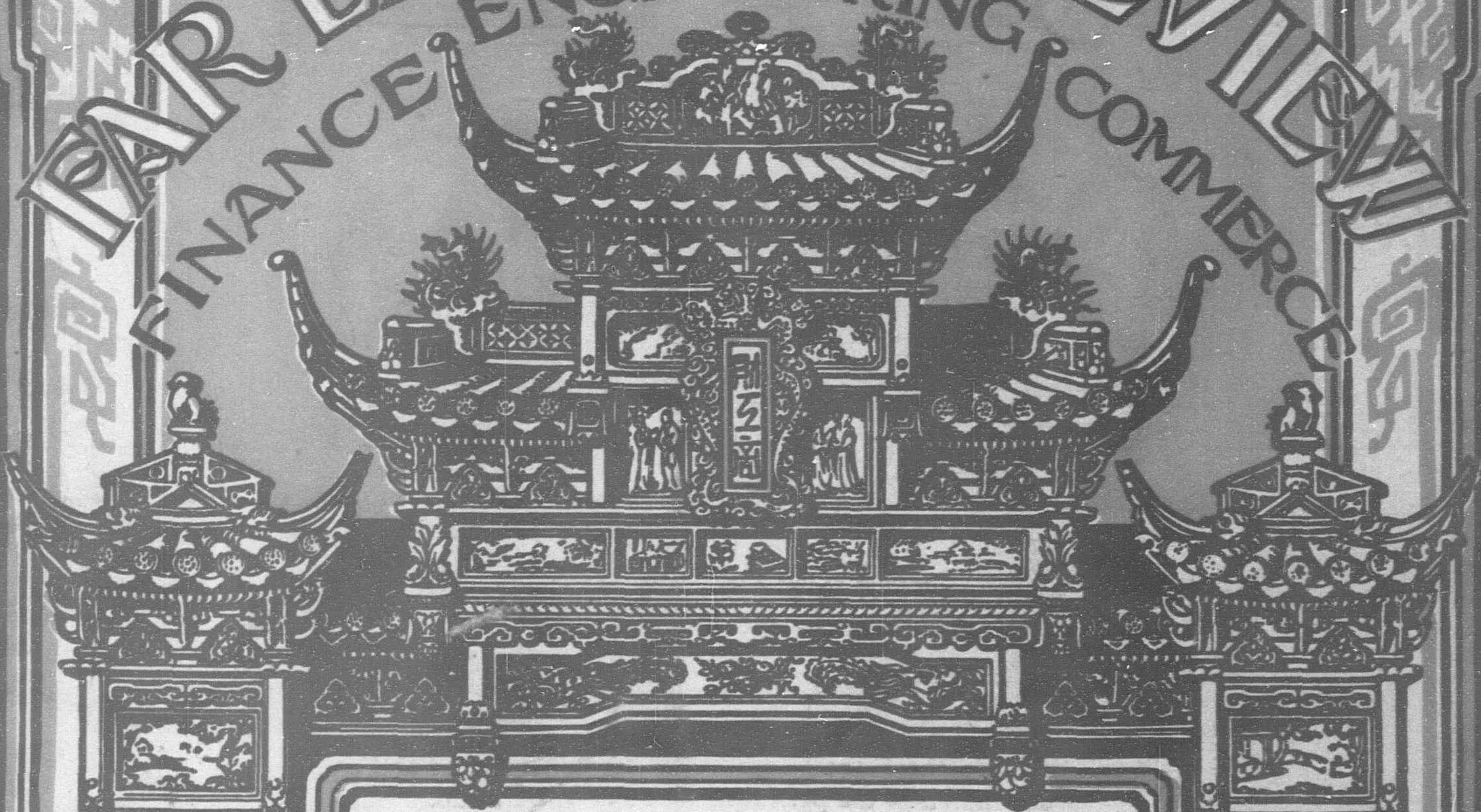


THE FAR EASTERN REVIEW

FINANCE ENGINEERING COMMERCE



IN MEMORY OF SUN YAT-SEN

By George E. Sokolsky

SOME RAILWAY PROBLEMS
IN CHINA

FINANCING IN A FOREIGN
CONTRACT

AMERICA, JAPAN AND CHINA

By Frederick Moore

上海仁記路拾六號

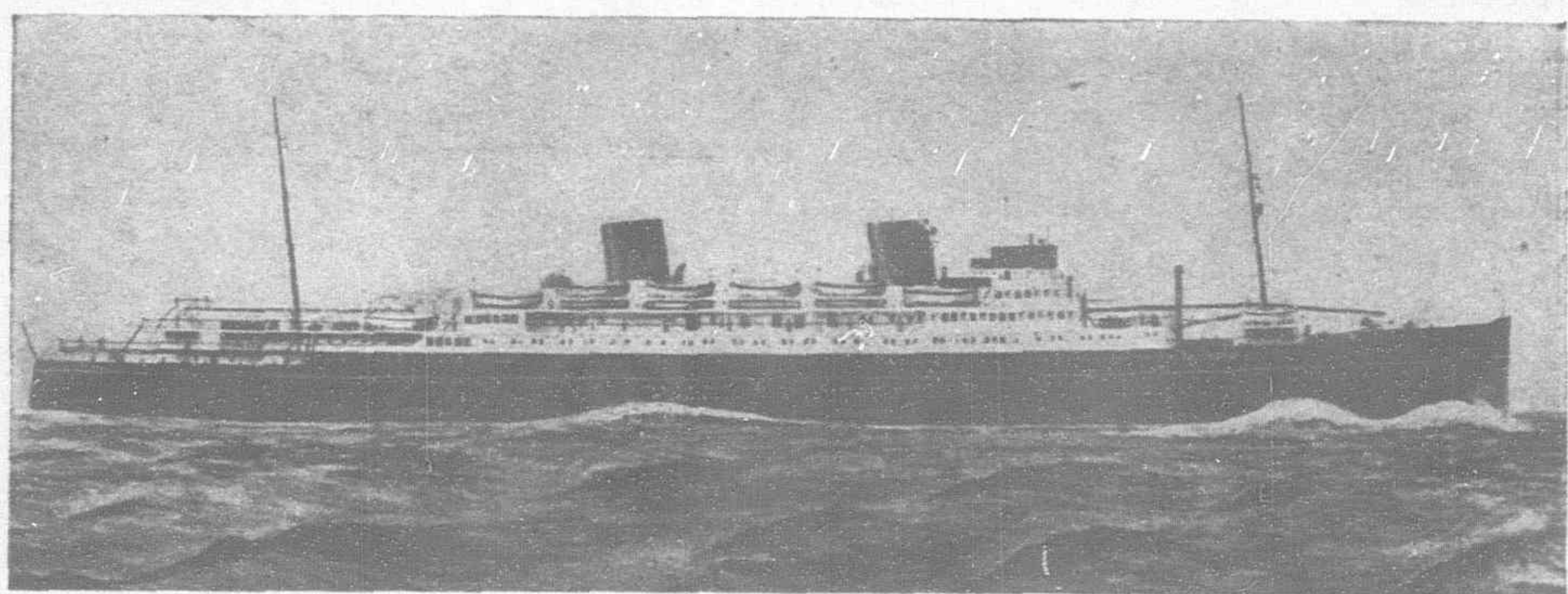
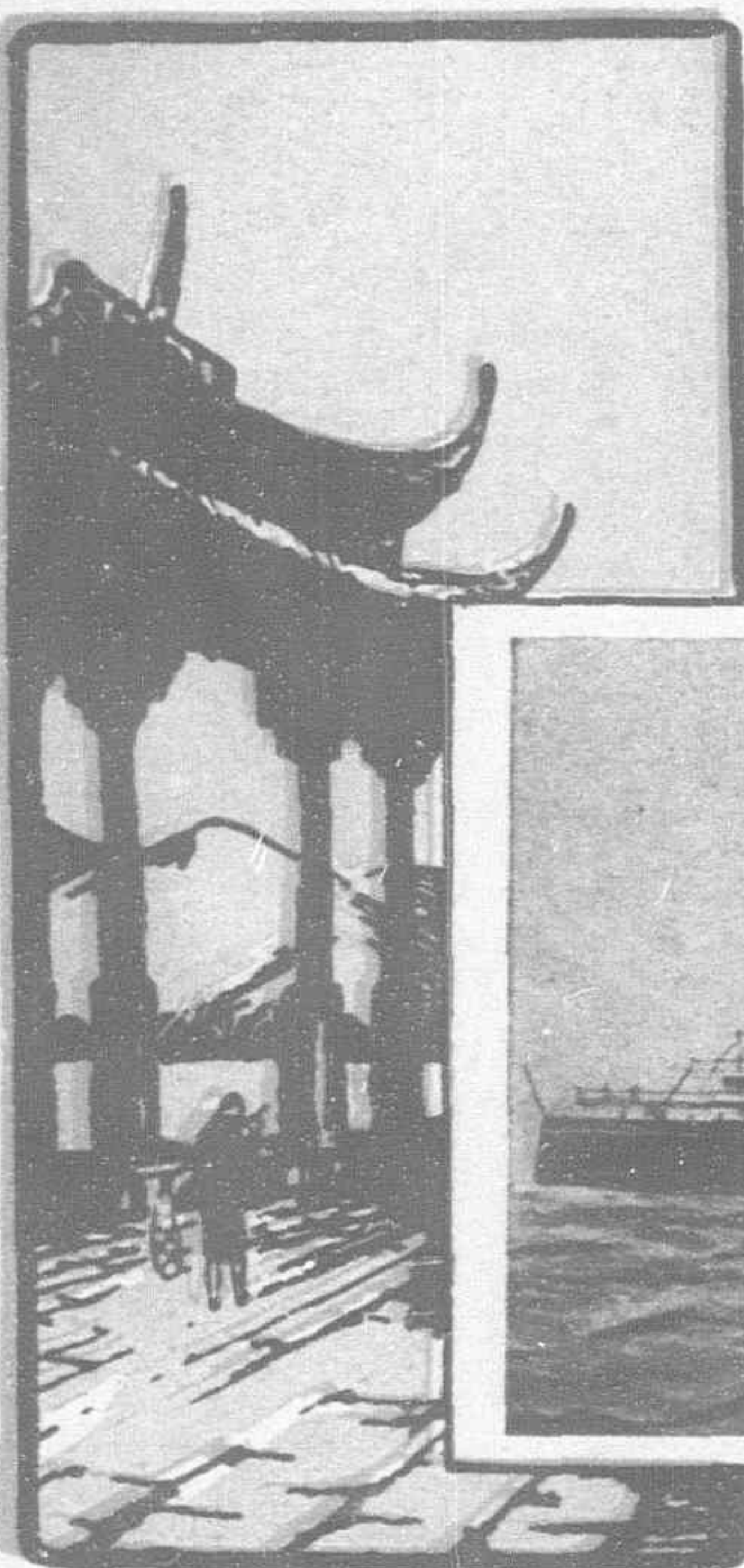
遠東時報

Vol. XXV

June, 1929

No. 6

New Era Dawning in Trans-Pacific Travel



One of the Transcendent Trans-Pacific Trio ordered by the N. Y. K. Line to be commissioned in their Orient-California Fortnightly Service in 1929.

Details of the Transcendent Trio:

Quadruple Screw Motor-driven Passenger Liners.

Tonnage	...	...	...	...	16,500 gross tons, 22,000 displacement tons
Length	...	...	...	...	560 feet
Speed	...	...	...	...	19 knots

These vessels will embody the highest ideal of a passenger carrier and are expected to revolutionize the passenger traffic on the Pacific.

Principal Passenger Services in operation:—

To North America

Orient—California, Fortnightly Service.
Orient—Seattle Service, Fortnightly Sailings.

To South America

Orient—South American West Coast Service, approx. Monthly Sailing.
Orient—South American East Coast Service, approx. Monthly Sailing.

To Europe

Japan—Europe Fortnightly Service.

To Australia

Japan—Australia Monthly Service

To Bombay

Japan—Bombay Monthly Service.

To Japan

China—Japan Rapid Express Service, sailings every four days.
Tsingtao—Japan Semi-monthly Service, etc., etc.

For information, please apply to

Shanghai
31 The Bund

Tsingtao
20 Kuan Tau
Road

Tientsin
K. Y. K. Line,
French Concession

Hongkong
King's Building,
8, Connaught Road

N. Y. K. LINE

Head Office: Yusen Building, Tokyo

The Far Eastern Review

ENGINEERING

FINANCE

COMMERCE

VOL. XXV

SHANGHAI, JUNE, 1929

No. 6

In Memory of Sun Yat-sen

By George E. Sokolsky

IT was during the exciting days of the Student Movement in 1919, that I met Dr. Sun Yat-sen at his house on Route Molière in the French Concession of Shanghai. Dr. Sun was then living very quietly, writing his book on the "International Development of China," which his wife was preparing for the press. His house was a Mecca for Chinese and foreigners, but in those days the foreigners were few, because Dr. Sun was regarded by most of them as a man who had failed.

Only those who knew Dr. Sun Yat-sen intimately can understand the tremendous force of his personality and the spell which his very name exercises over the Chinese masses even at the present time. I have met numerous Chinese leaders and officials during the decade that I have been reporting on men and events in China, but few of them even approximated the magnetic appeal, the instant conviction of sin-



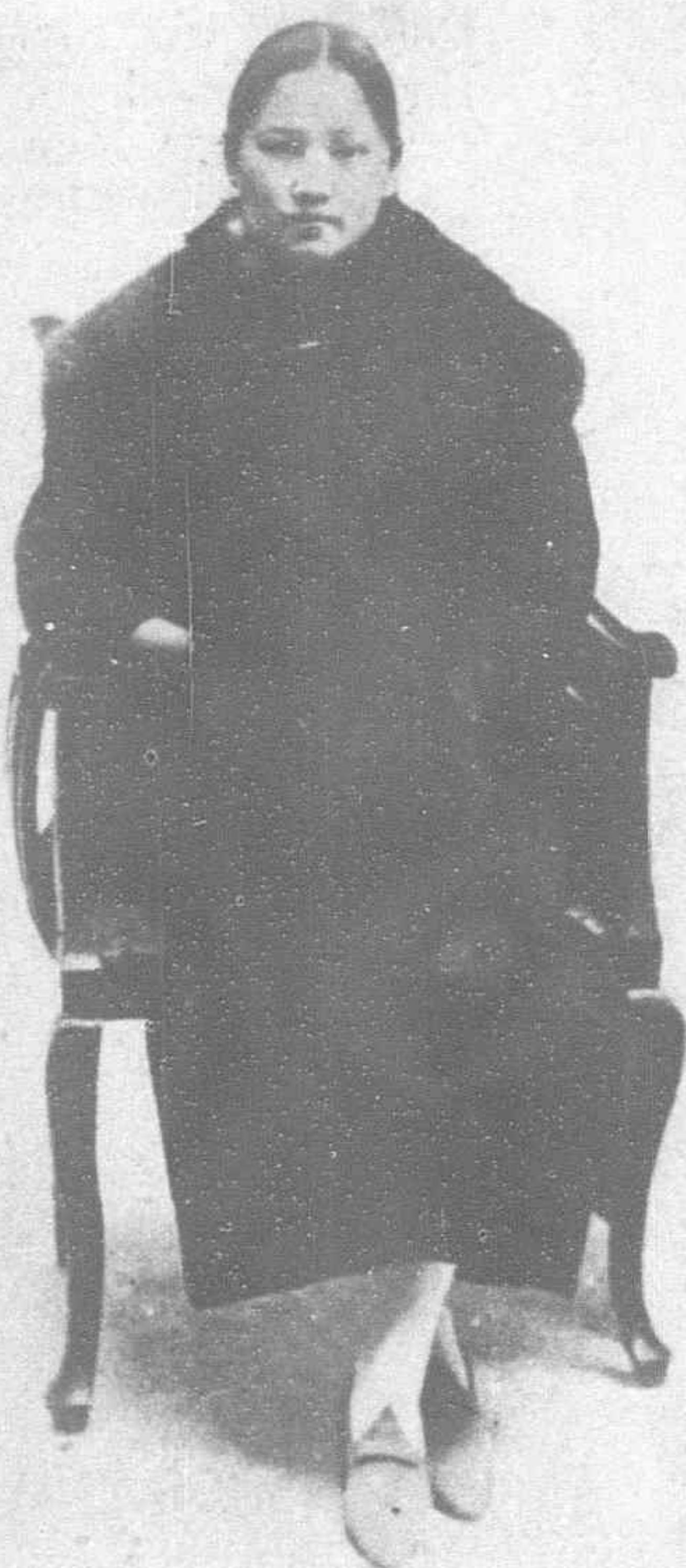
Dr. Sun Yat-sen

cerity, the sturdiness of character which elevated Dr. Sun above his associates. Mr. Tong Shao-yi possesses perhaps a broader culture and a more human approach; Dr. Wu Ting-fang was endowed with a keener sense of humor and a greater worldliness of wit. But Dr. Sun was a dynamo. He breathed action, force, fight. He turned every friend into a disciple and even if one doubted the practicality of some of his programs, no one who knew him, could doubt that only a deep sense of patriotism inspired his every thought and motive.

The house on Route Molière was a sanctuary for

an American, for it breathed an American atmosphere. Mrs. Sun had been educated in one of the Southern Methodist colleges, and her home possessed the breadth of Southern taste and hospitality. The place of honor in the drawing room was devoted to a portrait of George Washington.

In those days, Dr. Sun was more the philosopher than the politician and the warrior. We often discussed his philosophic doctrines as they appear in the "Fundamentals of National Reconstruction" and in "Sun Wen's Philosophy." The doctrine that it is easier to do than to know often led to a discussion of pragmatism, which was made all the more interesting by the presence in China of Dr. John Dewey and it was a delight to be introduced by Dr. Sun to the philosophy of Wang Yang-ming, of which I eventually found an English translation.



Mme. Sun Yat-sen



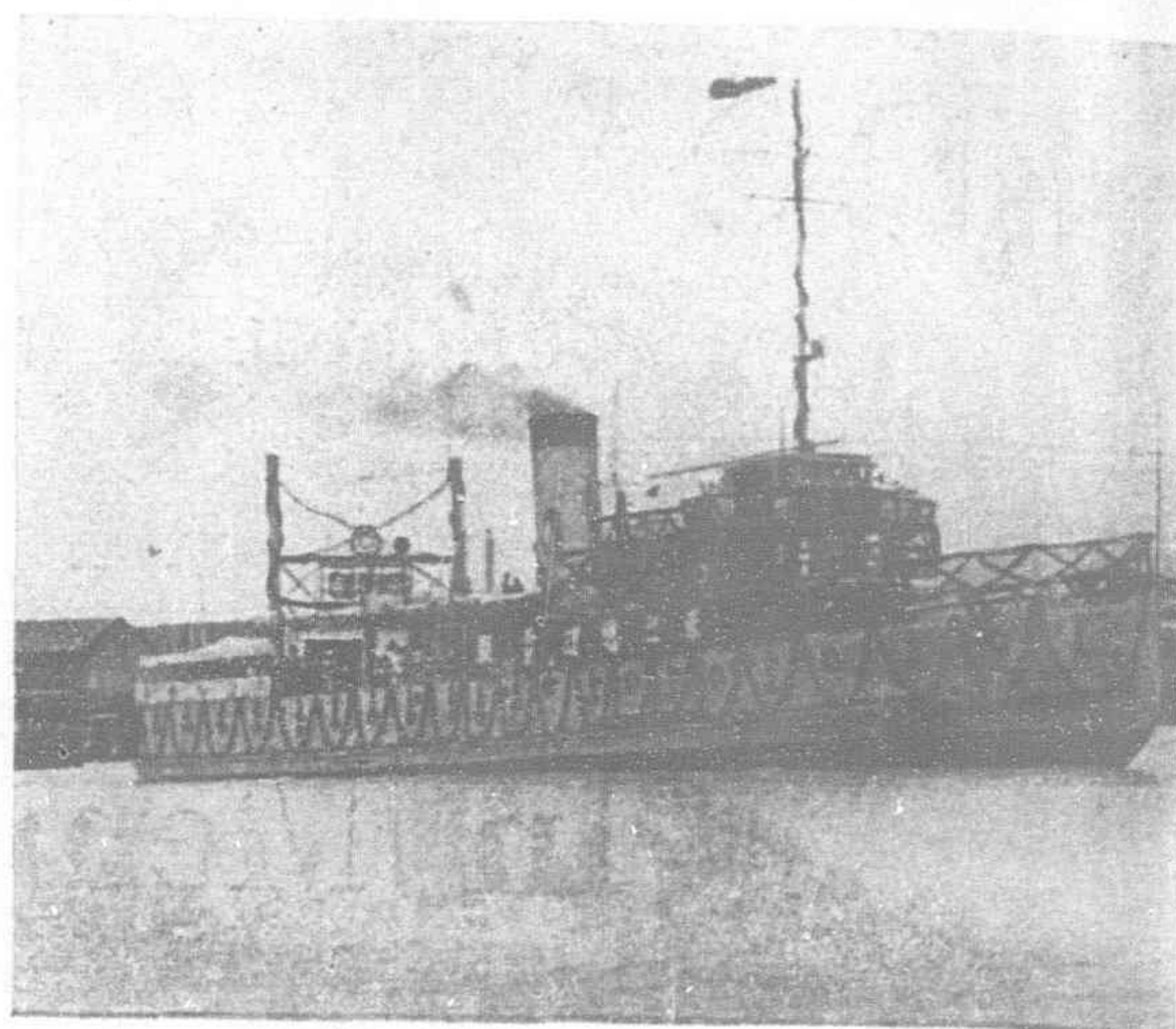
Mr. Sun Fo



Mr. Sun Fo at the Funeral

Dr. Sun took the keenest interest in the Student Movement. He had not come into active contact with the younger students, who had been followers of Liang Chi-chao. The movement found its birthplace in the Peking National University under

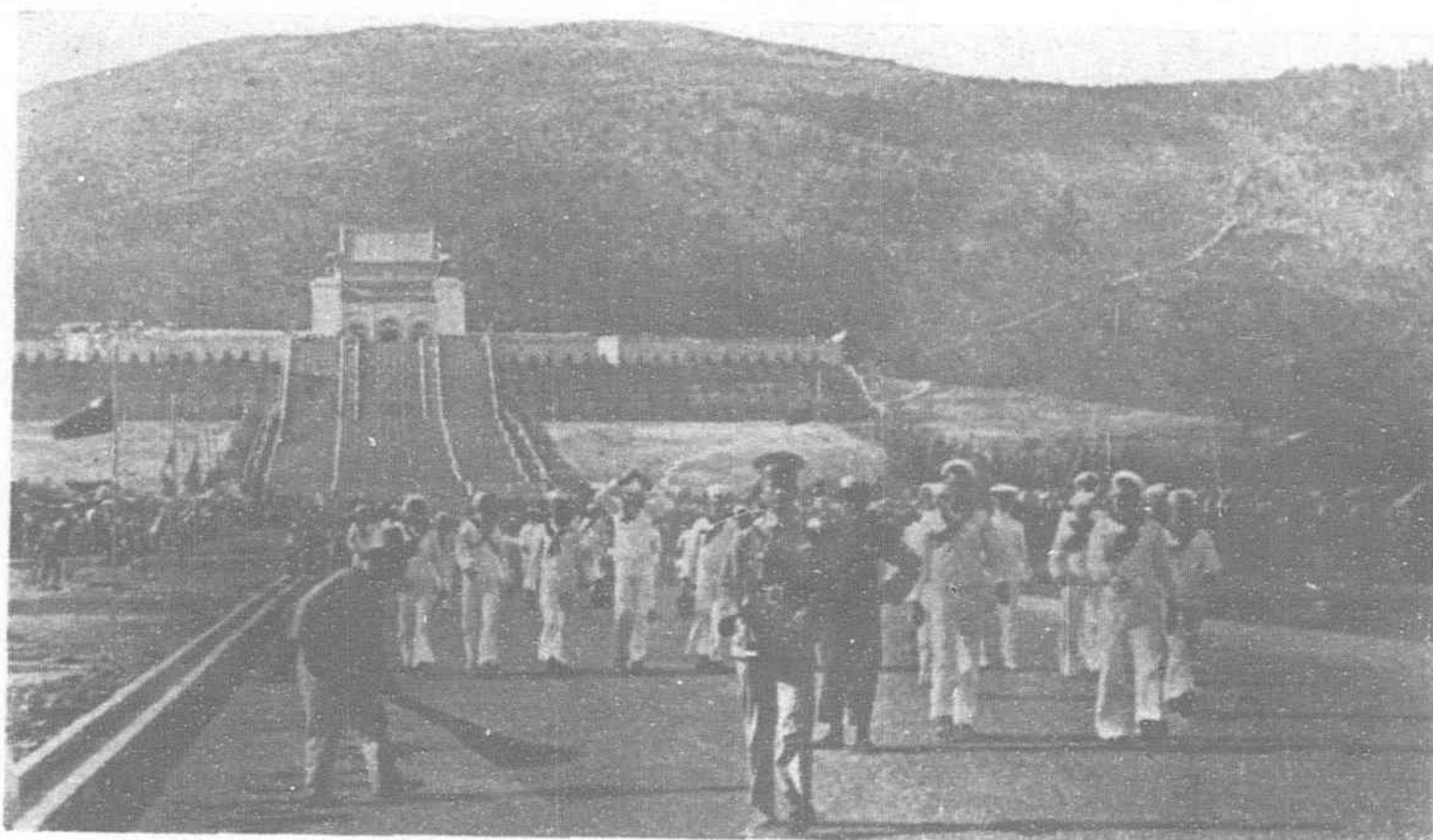
in the French Concession, might remain open. Mr. Ho is now President of the Provisional Court in Shanghai. The circumstances of Dr. Sun's meeting with Mr. Dih Kan are most interesting. Although there were all kinds of rumors that



Transporting the Body Across the Yangtze

the aegis of Dr. Hu Shih and Mr. Chen Tu-shu. Mr. Liang Chi-chao was regarded by the intellectuals as China's most brilliant light and to them Dr. Sun was more the political than the intellectual leader. The Student's Movement, however, aroused in the students a sense of the necessity for direct political action. At first, they avoided Dr. Sun as they did all political parties because they feared the effects of such complications upon their movement. Eventually, however, the students became the foundation upon which both the new Kuomintang and the Communist Party of China were built.

As I remember it, Dr. Sun first came into personal contact with the Students Movement through Mr. Ho Shih-tsen, then President of the Shanghai Students Union and Mr. Dih Kan, President of the National Students Union. Mr. Ho called on Dr. Sun to ask him to use his good offices with the then acting French Consul-General in Shanghai, so that the headquarters of the Students Union, which was



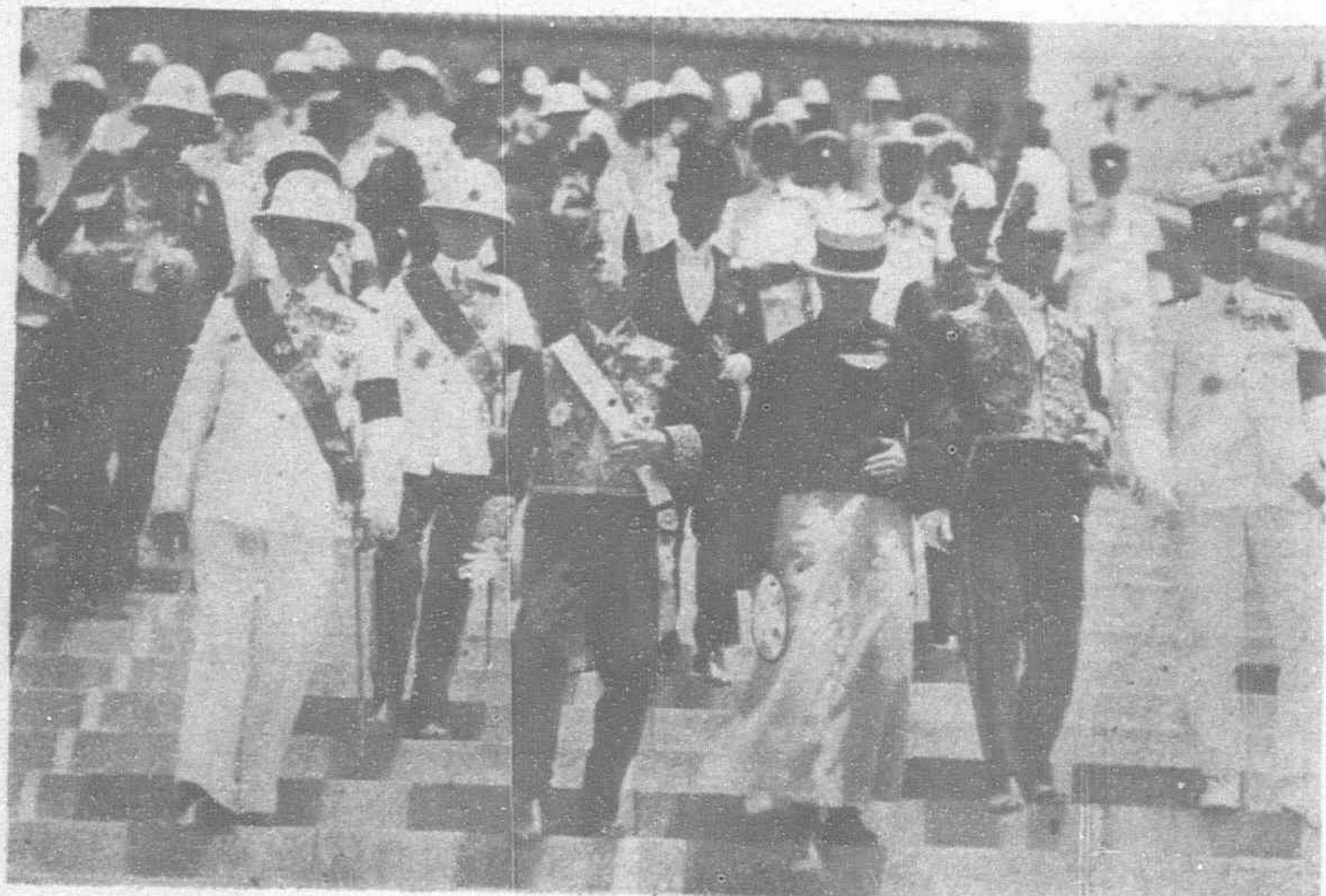
American Sailors Leaving the Tomb



The Coffin Ascending to the Tomb

the Students Union had accepted funds from various political groups, actually there was not enough money in the treasury to pay the rent for the headquarters. I spoke to Dr. Sun about that and asked him if he could get \$300 for the Students. Dr. Sun replied that he would give them this sum and asked me to send Mr. Dih Kan to see him. The next day, we both called on Dr. Sun and the contact was established. Later, I understand, Mr. Dih became one of Dr. Sun's secretaries.

Dr. Sun always had a fine admiration for the United States, but he could not understand why Americans tended to support his enemies, while he was fighting all the time for constitutionalism, for that very type of government, which Americans regarded as the best. At that time, only three American journalists favored Dr. Sun and his cause. They were Mr. George Bronson Rea, Mr. Nathaniel Peffer and myself. The others were often vicious in their attacks, as one can now read in their publications from 1919 to 1925. In



Japan at the Funeral

fact, as long as Dr. Sun lived, most American journalists discredited him, it was only after his death and when his cause had succeeded that they hopped upon the successful wagon. As forgiving as was his nature, the vile things said about him by these journalists often caused him to wonder, for he could not understand how any American could fail to sympathize with and support his cause. Sometimes journalists would misquote him and once his agents in America forced an American magazine to withdraw something that a woman journalist wrote about Mrs. Sun. Usually Dr. Sun ignored personal attacks, just as he forgave personal enemies. It was his philosophy of life that knowledge was hard to attain and that therefore most men more naturally believed what it was easiest for them to absorb. The deeper and truer knowledge which required keen study and a scientific mind was not for most people—therefore, he could forgive even one who fought against him.

Unlike most Chinese leaders, he bore his enmities so lightly, that once when I asked him why he took a certain general back into the fold, he replied that as long as a man declared that he accepted his principles, he could not reject his allegiance. There was, however, one exception. Dr. Sun looked with deep disdain upon those former Kuomintang young men—some of the "Young China" Group of 1911, who turned from him to support various northern militarists, and whose activities made Dr. Sun's contacts with the foreign Powers more difficult. He called these men traitors. Once when I argued that one of these men was of service to China, Dr. Sun showed anger, which was rare with him in those days when his attitude seemed to be that even Tuan Chi-jui could be

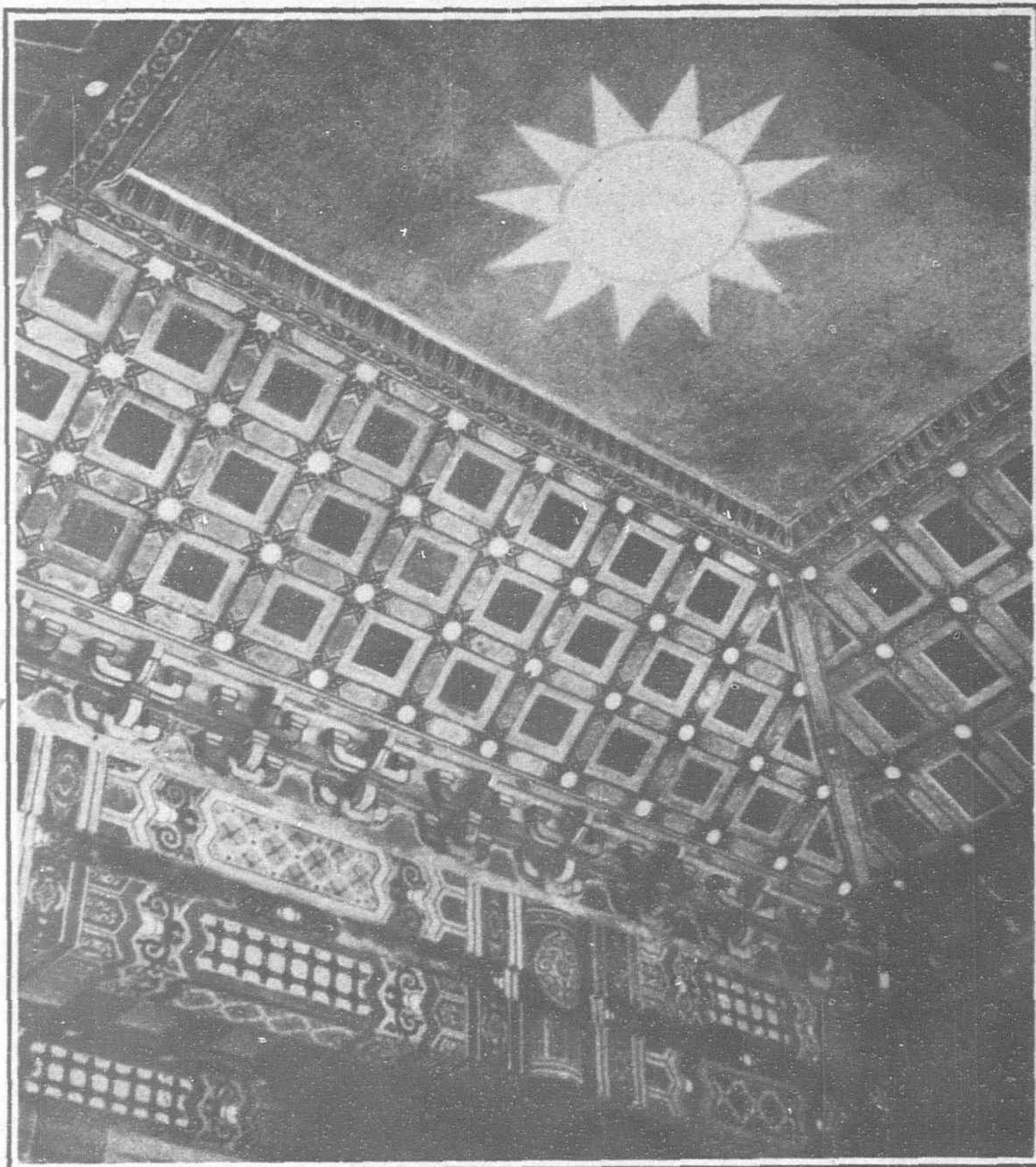
accepted if he acknowledged his principles.

Dr. Sun was no enemy of the Japanese people. He often spoke of his days in Yokohama and Kobe, of his friendships, particularly with Mr. Toyama, Mr. Yukio Osaki, Mr. Innukai, the father-in-law of Mr. Yoshizawa, and Baron Shibusawa. He suspected the policies of the Japanese militarists and in 1920 wrote a letter to General Tanaka appealing to him, as the head of the Japanese army, to stop supporting the enemies of constitutionalism in China. He always looked forward to Japanese public opinion to overcome his antagonists in Japan and if he died without realization of this ambition, it is nevertheless a fact, that at the present time, public opinion in Japan is favorable to his cause.

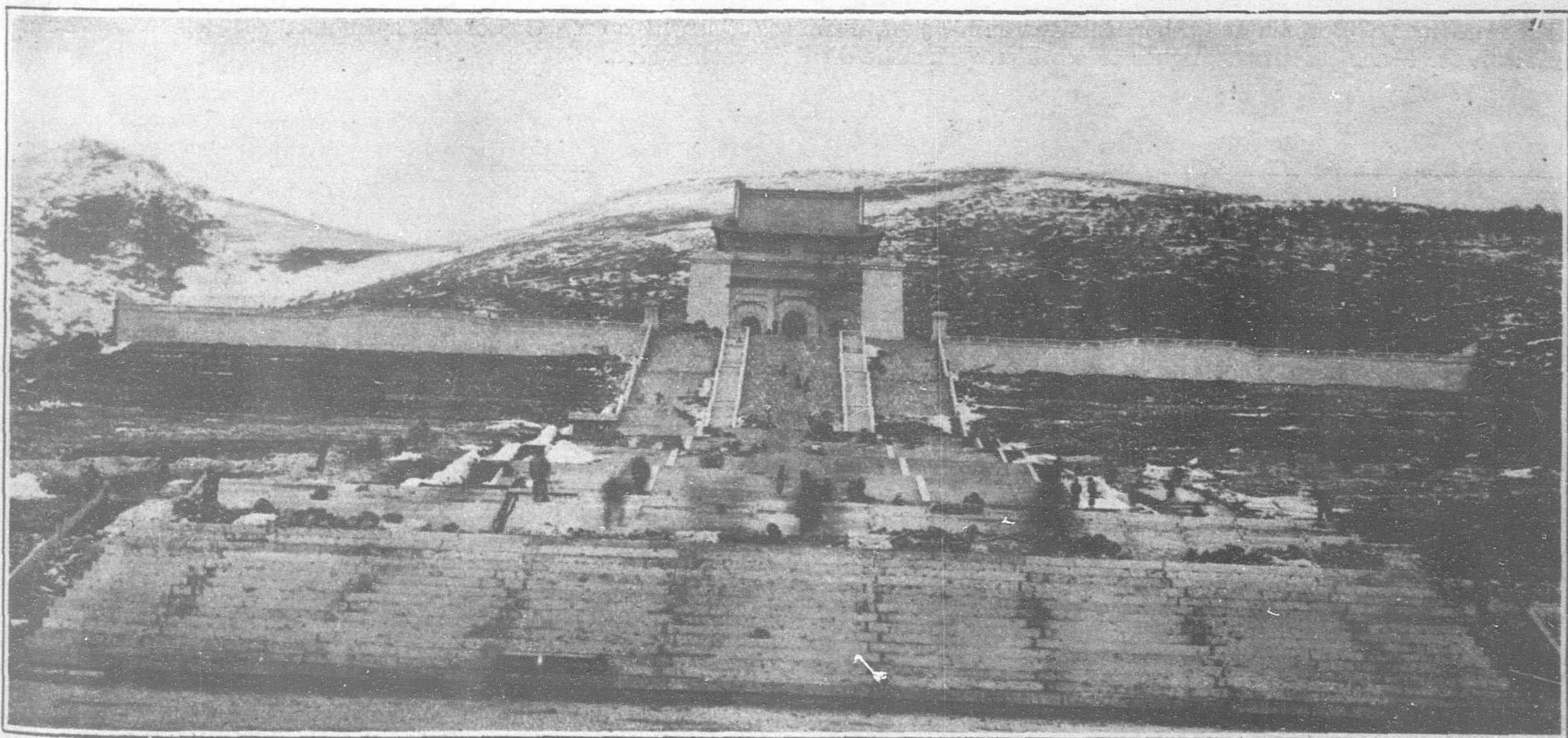
Dr. Sun always feared Great Britain because he felt that Britain's possession of India made it logically impossible for the British to support him or his movement. Yet, he looked forward to Hongkong's support of his efforts for the economic develop-

ment of Kwangtung and he turned to Great Britain for assistance before the British and American refusal forced him into the arms of Soviet Russia. Both Eugene Chen and Morris Cohen, Dr. Sun's A.D.C. can testify to the fact that Dr. Sun made a strong effort to obtain British instructors and advisors before he accepted Russian assistance.

Of his dealings with Russia, I know very little. He was once elected Honorary President of the Chinese Peasants and Laborer's Soviet in Moscow and I was in his house when the cable arrived in French via London announcing this appointment. There was, during 1919-1920, in Shanghai, a brilliant Russian linguist, Mr. Popoff, who was studying conditions here. Popoff knew Chinese,



Interior View of Memorial Hall Ceiling Dr. Sun Yat-sen's Mausoleum



General Front View of Dr. Sun Yat-sen's Mausoleum (Taken February 1929)

Japanese, Korean and Mongolian languages and numerous dialects. He spent most of his time reading newspapers in these languages. He met Dr. Sun on several occasions when I was present but I heard nothing of a political nature. After his conversation with M. Joffe, the Russian contact was moved to Canton and naturally I could know nothing, from direct personal experience, about that.

When I arrived in Shanghai in 1919, I had spent a year in the North after having witnessed the most stirring days of the Russian Revolution in Petrograd. Dr. Sun was keenly interested in the details of this situation. He wondered always why others succeeded in their revolutionary activities while China failed. He always emphasized the "will of the people," and he insisted that no movement, no military effort could possibly succeed in China, which ignored the "will of the people." In an interview he once gave me on this subject, he said.

"My attitude toward the Peking government is the same as my attitude toward other factions in China. The most pressing matter before the Chinese people to-day is the unification of China behind one central government which shall function in accordance with laws and the will of the people. It is only unification achieved on this basis that can protect the people and prove to the world that the Chinese are sincere in their efforts to establish a modern and effective government capable of handling, independently the problems confronting a modern state.

"All factions in China will eventually have to adopt this program and significant progress has, within the last year (1922) been made in this direction. Many of the militarists who hitherto regarded themselves as supreme and above the constitution and Parliament might curry public favor by declaring themselves the protectors of both.

"When I returned from Canton the word went forth that I was defeated and discredited. My opponents did not understand that Sun Yat-sen does not matter but that his ideals and principles can not be defeated or discredited, and that the present situation in Canton is only another indication of the insistence of the Chinese people that these shall be realized. My desire is to unify the whole of China."

Even in this cursory sketch, it is impossible to omit mention of Dr. Sun's wife. Mrs. Sun's personal charm, her all-pervading sweetness, her keen sense of justice and her unselfish devotion to "the Doctor" brought to her the affection of all his friends. One sometimes wonders how much of his greatness is due to her inspiration and the strength that comes from the love and support of a great and good woman.

I never saw Dr. Sun after 1923. The attacks upon him by the foreign Press, the attempt to prevent him from landing in Shanghai, and the presence of Borodin and other Russians on his staff, made it difficult for a non-Russian foreigner to see him. Then he died

on March 12, 1925, curiously enough on the same day and the same city as died my closest friend in China, Roy Anderson.

In 1926, I visited Canton and experienced the religious significance of the personality of Sun Yat-sen. The following description was written immediately after witnessing a Monday weekly service:

It is Monday morning. The work of a new week is to commence. At the Whampoa Academy, the Central Executive Committee, the Kuomintang branches, every barrack, every army in the field, among boy and girl scouts, in every Government office, men and women stand bare-headed waiting for the presiding officer to call the meeting to order.

The gavel is struck against the table. The room, the camping grounds, the assembly hall and office are in profound silence. Together in harmony heads are bowed three times before the picture of Dr. Sun Yat-sen. Then his last will and testament is read, the statement of a dying man to his followers. No one whispers or even dares to cough as the oft-repeated words of the dead leader are pronounced. Then there is a three-minute silence for self-examination and revelation, for consideration of the doctrine and the self-determination of fitness for participation in the work of the Kuomintang. After the silence, reports are read as regards the work of the party and the activity of the particular group attending the service.

Nowhere in China have I witnessed any gathering of Chinese so emotional, yet so peaceful and profound, as at the ceremony of the reading of the will on Monday morning. I saw such a ceremony once in Shanghai, when a memorial service was held for Dr. Sun at West Gate, but it was tawdry and chaotic. In Canton, every moment of the silence breathed a new atmosphere, reminding one of the tremendousness and strength of the people of China and the heart-breaking difficulties facing those who would win for her national greatness, and for her people racial equality. Even the casual visitor, not a member of the Kuomintang, even a foreigner in a city where now foreigners are perhaps not always welcome, was moved. He also bowed his head three times. He also listened to the reading of monosyllables which he did not understand. He also stood in silence and reverence. He also found peace and thought in the three minutes of silence. He also was moved to sympathy and friendship for those about him. Such is the heritage of Sun Yat-sen. Therein lies the full significance of Sun-Yat-sen. He has become in death, even a greater and more powerful leader than he was in life.

The Kuomintang to-day may not be what it was in 1926. The Party may have degenerated because of the prevalence of militarism and the absence of really great leaders, but the spirit of Dr. Sun Yat-sen lives on. Out of this spirit alone can come the new and greater China.

Some Railway Problems in China

THE startling outbreak of civil war along the Lunghai and Kinhan Railways was accompanied by the distressing reports of the heartless destruction of bridges, telegraph poles, tunnels and the road-bed of these lines by the Kuominchun troops. Similarly, a Hongkong report dated May 11, states that one of the largest bridges on the Canton-Kowloon Railway over the Shektan River was blown up by Cantonese troops to check the Kuangsi advance. It is difficult to believe that at a time like this, when the Ministry of Railways is doing everything possible to reconstruct the existing lines and to create new ones, the militaristic vandals on all sides continue their campaign of unmitigated destruction. According to a *Kuo Min* report on June 5, the cost of repairs for damage done on the Lunghai alone

is estimated to amount to \$4,000,000. It is possible that this may be exaggerated but it is difficult to understand why there should be any destruction of China's few thousand miles of railway by Chinese generals. How can they expect that the era of reconstruction will commence, when they are constantly hampering and impeding the administrative officials who are devoting themselves to a new China.

In this connection, it is interesting to read Mr. Yeh Kung-cho's address at the first annual meeting of the Railway Society of China.

Mr. Yeh Kung-cho spoke on railways and their relation to the people's living or the people's existence. He divided his address

into three parts and said that, before the construction of a network of railways was started, a detailed scheme must first be drawn up as to the more important lines and those which were of less importance. Those which were more important should, naturally, be first constructed, after which work on the others could be started. For instance, he said, the building of railways in the provinces of Sinkiang and Kansu would not only greatly facilitate the defence of the nation, but they would be of great assistance in the matter of relief work in northwestern China, where hundreds of thousands were starving daily. Mr. Yeh was of the opinion that these should first be built. The Shanghai-Woosung Line, in his opinion, was of comparatively less importance because Woosung was connected with Shanghai by the Whangpoo River, but, owing to the lack of a detailed scheme beforehand, the Shanghai-Woosung Railway was the first railway to be constructed in China. Even up to now the question of railway construction in Sinkiang and Kansu had not been taken up.

Secondly, Mr. Yeh dealt with the question of freight charges, transportation expenses as a whole, and said that these were by far greater in China than any other country in the world. For instance, he said, wheat, the raw material for making flour, was formerly one of China's main products, but now 70 per cent. of the wheat consumed by the flour mills of Shanghai was imported either from Canada or from Japan. The reason for this was that shipping expenses from Canada were much less than the cost of transporting wheat from the interior provinces of China. The Canadian merchants utilized their opportunity and shipped wheat to China at a very low freight charge. Indeed, special concessions were granted to Canadian merchants by the Canadian railways to encourage them to ship wheat to China. For this reason, the price of Canadian wheat was cheaper than the price of wheat grown even in the southern section of the Tientsin-Pukow Railway.

Continuing, Mr. Yeh said that, in Germany, after the Great War, freight charges for shipping German products abroad were much lower than the charges made for transporting German products from one place in that country to another. This was why home industries in Germany had developed by leaps and bounds. The freight charges of the Chinese Government railways were by far too high in comparison with those charged by railways in foreign countries. Under such conditions, how could China enter the world's economic war? How could China compete with foreign powers in economical competition?

Conditions in railway transportation are constantly changing, the speaker said, and it was the duty of railway experts and those present at the meeting to discuss various questions relating to railway transportation so that such questions could be solved and easily handled in the event of changes being brought about.

In recent years, owing to the interruption of railway communications by constant internecine warfare and other reasons, only a very small quantity of grain came from the interior provinces, whilst the value of foreign imported grains had reached approximately \$800,000,000 annually. Should railway communications not return to normal in the early future, the Chinese grain question would become more and more serious.

Dealing with the third part of his speech, Mr. Yeh said that, owing to the present political situation in China, the limited amount of rolling stock in the country had not been utilized to the fullest extent and advantage. Civil warfare had caused the destruction of much useful rolling stock, passenger cars, freight vans and locomotives. Not only did the railways suffer considerably, but the merchants suffered because their goods could not be sent to customers. Owing to the interruption of railway communication in Shantung Province, for instance, the British-American Tobacco Co., of Shanghai had been unable to purchase tobacco leaf from that province, so they naturally turned to foreign sources for the commodity. Thus both the Chinese as well as the foreign consumer suffered. It was Mr. Yeh's concluding hope that this state of affairs would be remedied and remedied very quickly. He hoped that the Society would be of great assistance in bringing about this fruitful end.

The fault does not lie with the Ministry of Railways or the engineers, Chinese and foreign, who are working at the job in spite of heart-breaking difficulties. The Engineer appreciates the fact that the damage done to a railway by military vandalism is greater

than the mere destruction of rails or bridges; it makes it increasingly difficult for the engineers to attract capital for their enterprises. This is naturally of the utmost importance, for China needs huge amounts of capital for the development of her railway system and unless the militarists stop interfering with existing lines, it will be increasingly difficult for the engineers to raise capital for new lines.

Mr. Sun Fo, the Minister of Railways, submitted a memorandum to the second Plenary Session of the Central Executive Committee of the Kuomintang, proposing that \$150,000,000 be appropriated from the British and Russian Boxer Indemnity funds, for railway purposes. His memorandum follows:—

"The program of railway reconstruction was carefully outlined in Dr. Sun Yat-sen's plan for the industrial development of the country, for the late leader of the Chinese revolutionary movement realized that the development of China's communications was of vital importance to the livelihood of its people, and to its military and political affairs. In order to fully carry out the wishes of Dr. Sun, the National government has established the Ministry of Railways to supervise the reconstruction of the country's railways.

"Since my assumption of the post of Minister of Railways, it has been my daily work and hope gradually to complete the railway program of the late leader, Dr. Sun. Last January, I submitted a plan asking for the appropriation of a certain portion of the Customs and Boxer Indemnity funds for the reconstruction of the railways. The matter was discussed at a meeting of the Central Political Council, which later referred the question to three committees.

"The first committee was to examine the railway plan; the second the question in connection with the use of the Boxer Indemnity Fund and the third the use of Customs funds. The first committee submitted its report and the second has already begun investigations, but for various reasons the Customs funds committee has not yet started its work. To this day, therefore, no action can yet be taken by the government.

"In order to hasten the program of railway reconstruction, the Ministry of Railways had sent experts to various provinces for survey work. With the complete suppression of the Kwangsi rebellion, for the strengthening of the prestige of the Central government and in order to immediately carry out the government's reconstruction with its railway development plans.

"This will greatly increase the confidence on the part of the friendly powers in the sincerity of the National government to face its problems and will also fulfill the aspirations of the Chinese people. Even though the finances of the country may be so crippled at the moment that it is found impossible to proceed with the entire program of railway reconstruction, the plan may be worked out gradually.

"As the railway development is being divided into three periods and the completion of the Canton-Hankow, Lunghai and Tsang-Shih lines belongs to the first period, work should be started at once for the completion within four years of the former two railways. It is estimated that \$64,000,000 will be needed for the completion of the Canton-Hankow railway, and \$85,000,000 for the Lunghai line. It is hoped that the total amount of \$150,000,000 will be appropriated from the British and Russian Boxer Indemnity funds for the work. The bonds will be issued by the Ministry of Railways, using the Boxer Indemnity funds as security. The two railways are to be completed within four years.

"The profits of the two railways will be later turned over to the Central government for educational purposes. In fact, this is the safest investment the government can make with its educational foundation funds, and the plan will benefit both the educational enterprises of the government as well as its railway reconstruction projects. Trusting this proposal may meet the approval of the Second Plenary Session of the Central Executive Committee of the Kuomintang,

(Sgd.) "Sun Fo"

It is to be hoped that the National Government will make it possible for this sum to become available for railway purposes. China needs railways, highways, airways more than anything else at this time. China needs means of communication. There might be a slogan, a wise slogan—Railways first!

Financing a Foreign Contract

British and American Methods

THE British know China. They know that a railway between any two cities in that country will pay, if properly managed. Knowing its trade, its resources, its traffic possibilities and the industry of its people, the British never turn down any reasonable transportation proposition made to them. They have had enough experience with Chinese officials to waste no time on long-winded negotiations; they get their preliminary agreement signed and thresh out the details later.

A case in point. In 1913, the representative of Dr. Sun Yat-sen, commissioned with the task of financing his railway scheme, called upon the head of the British banking group interested in Chinese business. He handed him his power-of-attorney, a certified copy of Dr. Sun's appointment to build a national system of railways for China and a map showing the projected lines and asked the British banker would his group undertake their financing. The scheme embraced 10,000 miles of new lines and called for loans aggregating \$500,000,000. After a conversation lasting about ten minutes, the British banker, turned in his chair and said: "We will finance every mile of railway that Dr. Sun can give us. Call around day after to-morrow and we will discuss the details with my committee."

When a similar proposition involving only 1,000 miles of new lines was placed before an American banking house, the answer was; "We might be interested, but before we can consider the proposition, it will be necessary to send a commission of experts to China to survey the line, compile full reports and data on the resources of the country and estimate the possible traffic and earnings of the proposed line; Of course, the expenses of this commission must be paid in advance by the Chinese Government." In three other instances involving American financing of important Chinese undertakings, the contract was lost by insistence upon working out all the details before signing the preliminary agreement. The same general attitude towards financing railways and productive undertakings in China, still prevails amongst American bankers. They seem obsessed with the idea that China is a virgin country and before they can consider any new railway construction, the fullest detailed reports must be drawn up by a commission of American engineers and traffic experts whose expenses must be paid in advance by the Chinese Government.

Recently, a prominent American engineering firm completed a contract in the Balkans. The president of the company, asked to deliver a speech before an American business club, gave his experience in negotiating, financing, and executing the contract.

This speech has been published in booklet form, entitled "Contracting in the Balkans," by X. P. Reantz, which is a pseudonym for one of America's principal contractors. The booklet follows."

Contracting in the Balkans

By X. P. Reantz

ACT—I. NEGOTIATION OF THE CONTRACT

Time: Present.
Place: Council Room of the Department of Public Works.
Cast: The Minister of Public Works,
 The Contractor,
 A Dozen Members of the Contract Committee of the D. P. W.

The Minister is seated at the head of a long table—The Contractor sits beside him with his Interpreter—Members of the Committee sit on either side.

The Minister—"Gentlemen, I have called you together to consider the proposal which the Contractor has submitted for the building of the Great Muksquash Bridge. Mr. Smartaleckovitch, have you examined the proposal?"

Mr. Smartaleckovitch—"I have, Sir, and I find it altogether unsatisfactory. The Contractor in his calculations has failed entirely to take into account the Peanuts of Prophylactus. How can anyone build a bridge in Muksquash without taking into account the Peanuts of Prophylactus?"

The Contractor—"Your Excellency, may I ask the gentleman what the Peanuts of Prophylactus have to do with building bridges in Muksquash?"

Mr. Smartaleckovitch—"Everything. The Contractor evidently does not understand the Balkan mentality—what? Have we not made two peas grow in one nut where only one grew before? Who shall say that in time we will not be able to grow nuts with no pea in them at all? It is evident the Contractor knows nothing of bridge building in the Balkans. I am opposed to the Contract."

Mr. Knowitallopoulos—"Your Excellency, I, too, have studied the Contract but I take issue with the last gentleman's remarks—may I ask how he expects to grow peanuts without any pea in them? That sounds to me like raising hair from hairless dogs. I am convinced that before the Contractor can be given this Contract he must present to us the formula of how to put the P in peanuts. Until then I am opposed to the Contract."

(Mr. Abdul Bigbull, a Moslem Member of the Council, has been sitting apart, sour as a crab, looking out from behind a big, bushy black beard.)

Mr. Abdul Bigbull—"Your Excellency, I care nothing for hairless nuts or pealess dogs. They mean nothing to me. What I want to know is what the Contractor is going to do for the Babazooks of Bungaria. I am a Babazook and I'm proud of it. We are proud but poor. We need the moneys. What about it? I suspend judgment until I hear from the Contractor."

The Contractor (rising from his seat and bowing low to Mr. Bigbull)—"I salute you, Mr. Bigbull. I salute all Babazooks. You have in your veins the blood of heroes. Was not the Great Alexander a Babazook, and if I mistake not, Cleopatra herself? I will tell you what I will do for the Babazooks. I will erect two tablets on the bridge—one to the distinguished dead Babazooks, one to the living ones. We will dedicate the tablets. You will bring with you for the dedication twenty Babazooks—not dead ones but live ones—and we shall spend a week feasting together. Much bouzo will flow through the beards of the Babazooks."

Mr. Abdul Bigbull—"The Contractor has spoken like a wise man. I see he knows all about bridges. He has an open face like the volcano which spouts forth not only hot air but also the living fire of wisdom. I am in favor of the Contract."

Mr. Damphoolisky—"Your Excellency, I, too, have studied this Contract. I bring with me a Report on the Guano Beds of Peru. I would like to ask the Contractor if in his calculations he has taken into account the crows of Muksquash?"

The Contractor—"The crows of Muksquash? No."

Mr. Damphoolisky—"I thought not."

The Contractor—"What have the crows of Muksquash got to do with the Bridge?"

Mr. Damphoolisky—"Everything. How many crows a day do you think will fly over the bridge when it is built?"

The Contractor—"Haven't the least idea—maybe twenty."

Mr. Damphoolisky—"Exactly. I can show from long observation that 10 per cent. of all crows when in flight deposit their droppings on conspicuous objects. This means that two crows per day will deposit their droppings on this bridge year in and year out. I can prove from this Report which I have here on the Guano Deposits of Peru that at the end of 1,623,000 years the bridge, owing to the accumulated droppings, will be impassable and of no use. Why, therefore, build a bridge which will be useless? I am opposed to the Contract."

The Minister—"This is a serious matter. What has the Contractor to say to it?"

The Contractor—"Only this, your Excellency. We must consider ourselves fortunate that the cows of Muksquash have no wings!"

(Commotion—Abdul Bigbull lets loose a roar from behind his hairy face mask—Dampphoolisky scowls and gives Contractor a dirty look—Minister raps on the table for order and adjourns the Meeting—All proceed to adjoining room where Contractor has provided an elaborate lunch with unlimited Bouzo.)

NOTE: Bouzo is popular Balkan drink—stronger than forty bulls.

SCENE—II.

Place: The Council Room.

Time: After lunch.

Committee returns to Council Room, oozing bouzo at every pore—Meeting called to order.

Minister—after big hiccough: "We will now resume our deliberations."

Mr. Smartaleckovitch—"Your Excellency. It seems to me that the Contractor knows all there is to be known about bridge building. He has an open face, not a concealed one like our colleague Bigbull's. Besides, he knows how to put the P in peanuts. I move he be given the Contract."

Mr. Dampphoolisky—"I agree with Mr. Smartaleckovitch. I find he knows all about crows and has already discovered a solution which, put under the tail, effectually changes the habits of migrating crows. I second the motion."

(Minister puts the motion—carried unanimously—congratulations from everybody—Meeting adjourns to lunchroom—bouzo ad lib.) Announcement next day in the "Rougmalion Dirtgatherer:"

"An important meeting of the Technical Staff of the Department of Public Works was held yesterday under the presidency of the Minister of Public Works. The plans of the Great Muk-squash Bridge were laid before the Committee by the Contractor. The Committee studied the engineering problems involved and questioned the Contractor as to the best solution of them. After a whole day devoted to this examination the Committee reported in favor of awarding the Contract to the Contractor."

ACT—II. FINANCING THE CONTRACT

Place: A sitting room at Claridge's Hotel, London.

Time: Two weeks later.

Cast: The Contractor—American Banker—British Banker.

Contractor—"Gentlemen, my contract calls for 10,000,000 dollars. I must arrange to let the Bumgarian Government have a 10,000,000 dollar loan.

Amer. Banker—"Bumgaria? Where's that?"

Brit. Banker—"1,750 miles south-east of London as the crow flies."

Amer. Banker—"I must cable that information to my house in New York at once. Please be more specific—give it to me in yards, feet and inches."

(Makes rapid calculation—dashes off cable—gives it to Secretary to send marked "Urgent").

"What security will they give?"

Contractor—"Everything they've got."

Amer. Banker—"That's not enough. I want an option on what they expect to get in the next world."

Contractor—"That's already gone."

Amer. Banker—"Who's got that?"

Contractor—(Mentions name of hated rival in Wall Street)

Amer. Banker—"Hell's bells! That's terrible! We must block that." To Secretary—"Take a cable—mark it 'urgent'."

(Dictates rapidly for half an hour.)

Contractor—"But what about the Bumgarians?"

Amer. Banker—"Oh, the Bumgarians—well, we can fix them up—that's easy. We will send a commission, at their expense, of course, paid in advance, to study the economic conditions. A census must be made of all able-bodied men, women, children, cows, horses, sheep, swine, dogs, cats, parrots and canaries. The production of hot air per capita must be carefully determined. Efficiency experts must be sent to calculate the exact foot pound value of the Bumgarian oesohpagus. All that's easy but very necessary. I will cable my house at once."

(Starts to dictate cable)

Brit. Banker—"Fancy! How marvellous!"

Contractor—"Yes—but what about the loan? I have to start work in thirty days."

Amer. Banker—"Oh, the loan. Well, when we have received the above information I will consult with my British Associate here and we will formulate a plan which we will each submit to our respective banking houses for consideration."

Contractor—"How long will all this take?"

Amer. Banker—"Oh, six to eight months, I should say."

Contractor—(groans) "By that time I'm sunk."

Brit. Banker—"I say, what's all this about? Do you want some money?"

Contractor—"Yes, 10,000,000 dollars."

Brit. Banker—"That's a tidy bit—eh, what? For the Bumgarians?"

Contractor—"Yes, for the Bumgarians."

Brit. Banker—"The Bumgarians are all right. My people away back long ago helped to put the original Bumgaria on the bum. I know all about them. When must you have it?"

Contractor—"Right away."

Brit. Banker—"That's a bit awkward. You see, I'm a bit late for my tea. (Looks at his watch.) Won't to-morrow any time before lunch do?"

Contractor—"Oh, yes."

Brit. Banker—"Very good. Drop around before lunch and I'll have it ready for you. Sorry I can't wait any longer but I must be off for my tea." To American Banker—"Let me know if you want any part of it. Jolly good business this. Goodbye."

Amer. Banker swoons, recovers, calls for a drink and his Secretary—sends off 72 page cablegram to his office asking for their "Reaction on the Situation" marked "urgent."

Contractor—(Looking like Lazarus raised from the dead)—"Good old John Bull!"

ACT—III. EXECUTION OF THE CONTRACT

Time: One year later.

Place: The Bridge Site.

Cast: American Foreman, Balkan workman, and Interpreter.

SCENE—I

Amer. Foreman—"Well, what's the matter?"

Interpreter—"He says he is sick in the belly."

Amer. Foreman—"Got a belly-ache, eh? Well, what of it?"

Interpreter—"He says Company give him pain in the stomach."

Amer. Foreman—"Company did it? How?"

Interpreter—"He says Company mule kick him in the stomach."

Amer. Foreman—"What was he doing to the mule?"

Interpreter—"Brushing the flies off his behind."

Amer. Foreman—"Well, what does he want, a new stomach?"

Interpreter—"He says he wants a present to fix up his stomach."

Amer. Foreman—(rolling quid of tobacco from one side of mouth to other)—"Tell him to go to the devil. This ain't no stomach factory."

Interpreter—"He says, much oblige. He feel better."

SCENE—II

Place: Office of Superintendent of Works. Superintendent sitting at desk busy with file of papers trying to account for two pieces of flypaper reported missing by New York Office in last Report.

Enter Balkan Chief Inspector—snappy dresser—riding breeches, top boots, etc.—medals on his chest—very peevish and upset.

Ch. Inspector—"I am insult! I will not stand it! Corpo di bacco! I spit! Bah!"

Cont. Superint.—"What's wrong, Inspector? What's on your chest?"

Ch. Inspector—"What's on my chest? Medals, sir, Medals. You know not that I am hero? Yes, sir, one very big hero. Corpo di bacco!"

Superint.—"Oh, no, I didn't mean that. What's wrong? Who has insulted you?"

Inspector—"Your men, sir. I inspect the works, I pass the men. They work in the ditch. Do they come to attention and salute with the pick and the shovel? Not at all, not at all! I cannot accept responsibility of directing the works unless suitable apology is made by Company."

Superint.—"Goodness gracious! That's terrible!"
(Rings bell, assistant appears.) "Jim, the usual insult. Call out the Saluting Squad, fully equipped, picks and shovels. Fire two guns and dip the flag three times. Will that satisfy Your Excellency?"

Inspector—"That is good. I feel better. Maybe I smoke one of your good cigars, eh?"

Superint.—"Righto, fine—sit down. Say, that was a peach I saw you with last night at Fuzzy-wuzzy's. Any more like that around ... etc., etc."

one hour later:

Exit Contractor's Superintendent and Balkan Chief Inspector, arm-in-arm, en route to lunch at Fuzzy-wuzzy's. Armistice on for 24 hours.

ACT—IV. THE CONCLUSION OF THE CONTRACT

Place: The Great Bridge.

Time: One year later.

Occasion: The formal inspection and taking-over of the bridge by the Government.

Cast: The Premier, Minister of Public Works, Members of the Cabinet, Government Officials, Newspaper Men, Officials of the Contracting Company, etc.

The Premier—"So this is the Great Bridge. What did it cost?"

Min. of Finance—"About 16 billion kopekas."

Premier—"That's a lot. But why did you build it? I see no river here."

Min. of Pub. Works—"That's true. We need a river. I have thought of that. We have asked the Contractor to prepare plans to bring a river to it."

The Premier—"How much will that cost?"

Min. of Pub. Works—"About 16 Billion more kopekas."

The Premier—"We will then have a bridge that we can use?"

Min. of Pub. Works—"Yes, if the river doesn't dry up."

The Premier—"That's fine. I congratulate you, Mr. Minister, and you, Mr. Contractor, on the fine work you have done. I now accept the Bridge in the name of my Government, and I dedicate it to the spirit, energy, technical skill and ability of the Great Balkan people."

America, Japan and China

By Frederick Moore

[The following interesting chapter is taken from Mr. Frederick Moore's "America's Naval Challenge," a book of rare worth to the student of international relations. Mr. Frederick Moore was formerly a correspondent of the Associated Press in London and Peking and of the "New York Times," in those cities. He was also American Councillor in the Japanese Foreign office in Tokyo. He has had an exceptionally wide and important experience in Far Eastern affairs.—Ed.]

FOR more than twenty years there had been talk in the United States of possible war with Japan. From three different quarters the Japanese had been harshly criticized for a long time,—from our Western States, from China and from our army and navy.

The trouble had its beginning when we acquired a group of islands about the size of Korea on the Asiatic side of the Pacific. Military and naval forces had thereafter to be kept out in the Far East, arousing suspicions and acquiring them.

Before the Russo-Japanese War there was no justifiable anxiety in naval circles for the security of the Philippines, but the defeat of Russia was regarded as releasing the Japanese for attack, if and when they saw fit, upon our position in the Orient.

It is hardly realized by Americans at home, with their many other interests, what an important part their government and a comparatively small group of their compatriots have played in the affairs of the Far East or how they have influenced the policies of others in that region. We have used military and naval forces in East Asia repeatedly; we have held "special privileges" in several countries, obtained by force of arms or the display of them; we have insisted upon political adjustments sometimes contrary to the interests of other great Powers; we have attempted to spread Christianity and Western education in the East, and through our philanthropic and religious efforts we have come to wield much influence. We now hold an unusual position among peoples geographically, racially and in other ways comparatively remote from us. Indeed, if the period of the World War be excluded our participation in the affairs of the Far East has been more extensive than in those of Europe,—where at least our commercial interests are many times as great.

Much of what we have done has been beneficial to the people of Japan and China, to say nothing of the Filipinos. Certainly, in the long run, our activities have been helpful to the Japanese. They have profited by contact with us in both knowledge and material progress. And we have been the greatest educators of the "Young Chinese." But it is also true that we have fought the Filipinos, and that in helping to "awaken" Japan and China we have had a part in the revolutions that resulted in both those countries. In the case of Japan the effect has been good; the

people have benefited. But in the case of China the upheaval has still to bear valuable fruit.

For the past thirty years,—there has been an American movement to preserve China intact and independent and to arouse her to modern progress. That ancient country with her vast population, unparalleled history, glorious achievements and persisting horrors, possesses a romantic fascination for many Americans,—Protestant missionaries with the hope of serving masses of humanity spiritually, business men with thoughts of profit, navy men glad of the possibility of action, and diplomatists with the idea that America's distinterested position can be made to benefit the cause of liberty, advancement and peace. Our friendship for China has been the principal cause of our disagreements with Japan,—not that the two countries differ greatly regarding the importance of China's welfare but that at times they have disagreed as to the best and quickest means for the termination of her disorders and the promotion of her progress. The points of view are different primarily, because, to Japan the condition of China is of vital importance while to us it is largely a matter of sentiment. The business of Japan is affected by China's disorders; the average American knows of them only through the press.

It was the United States that "opened" Japan (in 1854). The island country has been practically closed to foreigners since the expulsion of the Catholic missionaries, who became politically powerful in the land in the sixteenth century. The feudal government then attempted to exterminate Christianity, restricted foreign traders to a small number of Dutchmen and permitted no Japanese to go abroad or even to build vessels capable of crossing the neighboring seas. It was after nearly three centuries of such isolation that we Americans, interested in the promotion of Oriental trade and requiring ports of entry for our merchantmen passing to and from the ports of China, invited the Japanese to come out of their seclusion. Our Government spoke diplomatically but sent a naval officer with a squadron of warships to deliver the message. And that officer, Commodore Perry, moved his ships closer and closer into the harbor of Yedo (now Tokyo) until the Japanese Government deemed it expedient to meet the American demands.

European nations promptly followed this example, likewise exacting treaties from the Japanese, and establishing trading

communities on their shore. Extraterritorial rights were required for Americans and Europeans because the Japanese had no police system nor law courts that could give justice to the foreigner. Justice was then arbitrary and autocratic in the islands.

The resentment of the Japanese was naturally intense. It took, however, only a few insignificant encounters with foreign warships and landing forces to demonstrate to them the difference in the fighting capacity of the foreign sailor and the Samurai, whose weapons were very largely bows and arrows and swords. Though in itself a trivial naval engagement, the bombardment of the forts and primitive batteries of Shimonoseki by the combined squadrons of Great Britain, the United States, France and Holland (in 1863) can be said to have brought about the rebirth of a nation.

It is interesting to read again how Townsend Harris, the first American Minister to Japan, attempted to reassure the Japanese Government in the following statement :

"The policy of the United States is different from that of other countries. She has no territory in the East. Neither does she desire to acquire any there. Her government forbids obtaining possessions in other parts of the world and we have refused all requests of other countries to join our nation."

But the Japanese realized their plight and set to work with conspicuous diligence to reform their country to meet the requirements of Western people,—at the same time that they studied the artfulness of the West in war. This necessitated, to begin with, a change from their antiquated form of government to a new and centralized system ; and revolution was the result.

After the overthrow of the Shogunate, in 1868, the restrictions placed upon foreign travel were brought to an end and the people were urged to go abroad and study. In large numbers young men were sent to Europe and America to attend foreign schools, and commissions were sent to make investigations even upon such matters as the Christian religion.

During this period of learning the Japanese both at home and abroad received much friendly instruction and information from Americans and Britons. English-speaking educators were prominent in the higher Japanese schools; at Annapolis and Greenwich a few Japanese officers were trained ; and for twenty-five years or more their government obtained naval vessels from the United States and England.

Modern police systems were organized, courts of justice established, and reasonable laws decreed and codified. By the end of the century the result was evident ; law and order prevailed in Japan as nowhere else in Asia. Indeed, life became safer from attack in Japan than in many parts of the United States, safer even for Americans. Then the foreign nations, led by the United States and Great Britain, surrendered their extraterritorial privileges, permitting their citizens in Japan to live subject to the laws of that country.

But during the last decade of the century, while the Japanese were recovering lost rights and making progress in the use of modern weapons, they were being faced with international dangers of another threatening character,—the acquisition of Eastern territory by the greater Western nations, including the United States.

When the Japanese defeated the Chinese in the war of 1894 they planned to remain in the strategic peninsula of Liaotung, which forms a point projecting south from Manchuria into the Yellow sea. But three European governments,—those of Russia, Germany and France,—"advised" them to withdraw ; and they decided it was best to do so.

Within four years, however, all three of these nations and also Great Britain had obtained positions for naval bases on the China coast, Russia herself leasing the particular peninsula from which Japan had been urged to retire. In 1897 the German Government, after the murder of two German missionaries, seized the Bay of Kiaochow, in eastern Shantung, demanded a lease of the territory embracing the harbor, and proceeded to make the province a German "sphere of influence," obtaining railway and mining concessions. In 1898 the Russian Government began its movement south from Harbin, on the Chinese Eastern section of the Trans-Siberian Railway. Following the German and Russian examples France obtained Kwangchowwan in South China, and Great Britain established herself in Weihaiwei in northern Shantung.

The United States demanded no such leases or concessions ; indeed, the State Department, then under John Hay, became conspicuous in trying to stop what appeared to be the beginning of "the break-up of China." The Secretary of State endeavored

to prevent the outlining of "spheres of influence" and tried to maintain "the open door and equal opportunity" for all nations trading with China.

But at the same time that our government was thus standing for China's integrity and independence, in the same year that the European Powers were establishing themselves in different Chinese harbors, the United States proceeded to acquire the Philippine Islands and to suppress by force a native movement for independence. Our government had caught the fever of competition for the overrated and costly prize of Chinese trade, desired to possess a commercial base in the East, and took the opportunity at hand to purchase the Philippines and Guam from Spain. The Spanish Government, deciding to withdraw entirely from the business of overseas empire, sold their other Pacific groups of islands to the Germans, then bent in the opposite way, upon imperial expansion.

Thus the great Powers of the West were moving ominously into the domain of the East. China and Japan were both deeply concerned, though they behaved differently in the attempts both were to make in a very few years to defend themselves from the dangers of these encroachments.

The action of China came first, was desperate, and failed. Chinese officials were divided in opinion regarding the method of dealing with the "White Peril." Some realized their country's military incapacity ; some were corrupt and profited by granting concessions ; some were for playing off the foreigners against each other ; and some were for driving them into the sea. The famous old Empress Dowager of the time favored the last of these courses, heeding the advice of the so-called Boxers, who claimed to be invulnerable against foreign weapons.

Europeans, Japanese and Americans ; diplomatic representatives, soldiers, business men and missionaries ; all foreigners alike were to be driven out of China. Indeed, the missions were a definite object of attack in this North China movement of 1900, as they were in 1927 in the Nationalist movement of South China. The special friendship of Americans for China protected our people on neither occasion.

The foreign legations in Peking were surrounded by Boxers and it became necessary for the European nations, the United States and Japan to send relief expeditions to that city to save the lives of their official representatives and other nationals. The soldiers of several of the foreign countries formed a joint army which became known as the "Allies,"—though there was as much rivalry and distrust among the commanding officers as there was among the diplomatic representatives jointly besieged.

The defeat of the Boxers was quick and ignominious, giving the Chinese an effective lesson. Finding they were no match in arms for foreign troops, the Chinese reverted to the traditional system of intrigue, of playing the foreigners off against each other. The behavior of the Japanese troops had been conspicuously good ; they were on their metal in the company of Western forces for the first time. The behavior of the Russians had been notoriously bad ; they had been contemptuous of Western opinion and had slaughtered mercilessly. Nevertheless, the higher Chinese officials (with whom the lives of the Chinese people have never counted for much) began to favor the Russians against the one Oriental people who had risen to a condition approximating Occidental efficiency. Concessions which were denied the Japanese were granted readily to the Russians and important agreements were made with them which further increased the anxiety of the Japanese.

The Russian movement south across Manchuria threatened to extend into Korea. Well-financed Russian agents began to appear in Seoul, the capital of that country, for the purpose of obtaining concessions to which the Japanese objected. The Korean officials, like those of China, seemed to favor the presence of the Russians to that of the Japanese. Jealousy of one's own sort who happen to rise in the world is perhaps only natural. If foreigners were going to enter the country Europeans were more acceptable than Asiatics.

Russian fleets and armies followed the concession hunters. Port Arthur was fortified ; a part of the Russian navy was sent out to the East with that harbor as its base ; and Russian troops became more and more numerous, moving down towards the border of Korea. As the Japanese saw the situation, it was not only China whose territory was being transgressed, nor only Korea whose independence was being threatened, but their own security as well.

The danger was unmistakable, but the Japanese dared not oppose it alone. The Colossus of the North, which all Europe had dreaded for a century, was a power too great for them to oppose single-handed,—not that they had failed to observe the deficiencies of the Russian armies; they knew these well. But Russia had friends. The French (established in Indo-China) might give naval and other assistance to their Ally. The Germans, though having differences with the Russians in the Near East, might give them help against Japan. It was quite on the cards that the Kaiser's government would find the "Yellow Peril" (of which he liked to warn the world) a good argument for naval expansion,—a reason among the German people and an excuse among foreign nations.

The Japanese Government tried earnestly to reach an agreement with that of the Tsar but found the latter unwilling to compromise. The Japanese then sought and obtained a treaty of alliance with the British (in 1902) providing that either party should go to the aid of the other in case of war with more than one adversary over an Eastern problem. Thus the British navy precluded assistance being given to the Russians by either Germany or France, and within two years the Japanese undertook the task of driving the Russian navy out of the Pacific and the Russian army out of Manchuria.

In the attacks upon Japan which have been conducted by American-educated Chinese and their American partisans since the close of the war in 1905, reference is constantly made to Manchuria as if the Japanese alone occupied that extensive territory; but they were only partially successful in the war. Their military and financial deficiencies after the battle of Mukden compelled them to accept President Roosevelt's invitation to make peace. The treaty of peace, concluded at Portsmouth, left the Russians still in occupation of three-quarters of the railways of Manchuria and still a potential menace to both China and Japan. Americans, however, took little notice of this fact, and the Chinese said little about it.

Five years had hardly elapsed before the agents of the Tsar were again at work in a similar way. Taking advantage of the distraction created by the Chinese revolution of 1911, Russian representatives encouraged the religious head of the Urga Government, known as the Hutukutu, to declare the autonomy of Outer Mongolia; and when this was done, St. Petersburg promptly recognized that potentate's autonomous status. The Chinese, however, paid little attention to the loss of this dependency (which is now part of the Soviet Union) and the United States heard almost nothing about the transition. The particular foreigners whose presence annoyed the Chinese more than any other were the Japanese, and those foreigners to whom they now particularly appealed for moral and political support,—the power of Russia having failed to defeat Japan,—were the American people.

During the Russo-Japanese War the United States, while technically neutral, was morally partisan in favor of Japan. President Roosevelt, indeed, went out of his way to warn the German Government to this effect. But hardly had the treaty of peace been signed here in the United States before our public and government opinion began radically to change. Even under the same Administration, that of President Roosevelt, warnings of an unmistakable character were put out to the Japanese. One of the reasons for the construction of the Panama Canal was said to be the developing arrogance of Japan. Early in 1908 a great American fleet was sent around the coast of South America into the Pacific on a visit to Japan, President Roosevelt having said in a communication to Congress that "this trip to the Pacific will show what some of our needs are and will enable us to provide for them. The proper place for an officer to learn his duty is at sea, and the only way in which a navy can be made efficient is by practice at sea, under all conditions which would have to be met if war existed." Here was the beginning of the discussions of possible war with Japan which were to become more and more pronounced until the Washington Conference took place, in the year 1922.

Immediately after the Russo-Japanese War our people in China began to question the presence of the Japanese in South Manchuria as if the Japanese were in a position to do the generous thing we had done in giving Cuba her independence. Americans were inclined to forget the Philippines. But to Japan our action in crossing the Pacific, acquiring successively the Hawaiian Islands, Midway, Guam and the Philippines, and then seeming to seek favor with China in the hope of trade profits in rivalry with Japanese merchants, were far more impressive performances than our with-

drawal from an island which no other nation would dare to enter.

The Japanese had several reasons for remaining in South Manchuria. In the first place the Chinese were unable to defend their northern and western frontiers against Russia. Besides this, the Japanese had harassing economic problems at home and looked to the almost virgin territory of South Manchuria for some relief. Burdened with the cost of the war, the neglected resources of this section of the nearby continent offered them some compensation for their failure to obtain an indemnity from Russia. Korea to which they looked for trade and some supplies of minerals, was a crowded country like their own and China proper, but Manchuria, about as sparsely settled as our western states, seemed then to be a vast open space calling for migration.

In Japan there are nearly four hundred people to the square mile, though four-fifths of the land is arid, while in Manchuria at that time there were probably not more than twenty. The birth rate in Japan was (and still is) very high, while the mortality is steadily decreasing, due to the study of Western medicine. Manchuria had long been neglected, like all the Chinese dependencies. The Manchu dynasty had for centuries denied their subject people the right to migrate to Manchuria, and the cold, the perennial floods and droughts and the bands of mounted brigands had together depleted that northern territory of many of the necessities of human existence.

At this present time it is interesting to note that not two or three per cent of the American residents in Korea would now object to the Japanese administration. Under the Japanese the Korean people have received a better government than any they ever knew under their native rulers. And South Manchuria is now the safest section of China for Chinese to live in. For the past fifteen years the Chinese people have been migrating to that territory from their metropolitan provinces of Chili and Shantung, because of the safety of life which the presence of about eight thousand Japanese soldiers assures along the South Manchuria Railway and by reason of the opportunities for earning a livelihood that great Japanese enterprises have brought about. The Chinese have gone to Manchuria by the millions, that is to say, to the number of one hundred for every one Japanese who has gone there. The Japanese are not anxious to emigrate.

But though there was justification for the Japanese position, it is also true that they became, after defeating the Russians, somewhat military in spirit and imperialistic in thought. The world has now changed its point of view and the Japanese have changed with the rest, but prior to the World War the example given the Japanese by Western Powers was intensely one of dependence upon arms and the acquisition of power and wealth. Their writers could point even to the United States as an example of a nation making aggressions upon others when advantages were to be derived. Mexico and Panama as well as the Pacific islands were noted.

The Japanese believed that they had a destiny to fulfill in the interest of the whole Far East. The Monroe Doctrine was declared to be their model. They had proved to themselves their ability to deal with one of the largest and strategically best placed of the foreign powers, and no more menacing infringements of Chinese territory were to be permitted. One of the Twenty-One Demands, which the Japanese made upon China in 1915, required a pledge from her to grant no more territorial concessions to foreign nations. This was in keeping with American ideas, but in the wide American denunciation of the Demands this one was seldom mentioned.

The Japanese army had saved the nation from disaster and humiliation and was looked upon as an instrument to relieve it of poverty. The military man was acclaimed as the savior and the hope of the country; and characteristically he accepted that position. He was in the saddle, as the saying goes, and was ready and willing to lead his people.

For the fourteen years that followed the Russo-Japanese war,—that is to say, until the World War gave a revelation of American capacity in arms and martial spirit and caused the Japanese no little anxiety—their military leaders continued to exercise power apart from the rest of the government. They could disrespect agreements made by their Foreign Office with those of other countries. The Foreign Office had always to take the War Office view gravely into account. A military spirit was fostered in Japanese schools. Prime Ministers holding expansionist views were appointed to office by the Throne on the advice of the Elder Statesmen.

The nation as a whole had failed to realize that in fighting the Russians their armies had been only partly successful against inferior European troops campaigning far away from their home lands for the uninspiring purpose of aggression. The Japanese had received unstinted praise from the English-language press, American as well as British, and did not make allowance for exaggeration due to American sympathy and British interests in their cause.

But of all the new ideas that came to Japan with the victory over Russia that of immigration to the United States particularly provoked American resentment. The Japanese had consciously become a first-class Power and aspired, as any people naturally would, to enjoy equal rights with the greatest of the others. In their diplomatic services and among the higher class of business men who had resided in the United States there was some understanding of the difficulties in the way of such aspirations; but among the military men and the ordinary Japanese who had not traveled abroad comprehension was impossible. Pride was in the air. The argument was put forward that the Japanese emigrant was the peer of those from many of the states of Europe, whom the United States admitted; but the fact was lost sight of that some of the inferior people of Europe benefit by being Europeans while superior Japanese are often made to suffer from being Asiatics.

Many articles were written and many speeches made by Japanese that had bad effect among Americans. The statements that Japanese made regarding us were no worse than similar outbursts in this country against them. It is doubtful if any were as bad as our worst. The Japanese are more courteous. But statements and demonstrations of no real importance in Japan are often taken by us as "inspired" preparation for government action. Americans are inclined to make the mistake of thinking that everything prominent Japanese do or say is with some design.

Naturally the Japanese, denied the privilege of coming as emigrants to the United States, resented our opposition to their going to Manchuria. Our attitude appeared to be that of the dog in the manger. No official protest against their going to Manchuria was ever made, but our diplomatic and consular representatives in China were too free in their criticisms, constantly denouncing the Japanese and speaking of the losses of trade that we were going to suffer. Manchuria now, because of the presence of the Japanese, has become, for the size of its population, the best market the United States has in China; but that was not expected by our people interested in the East twenty years ago.

In the year 1910, when Mr. Knox was Secretary of State and "Dollar Diplomacy" was being promoted, the State Department proposed what was called the "neutralization" of the Manchurian railways, the merging of the Russian and Japanese roads into one, to be financed and directed by an international banking group. Mr. Knox's object was said to be the removal of a source of danger of war. But the United States, whose citizens in the East had become by this time definitely partisans, was not the nation to make such a proposal to the Japanese. They suspected the American Government of unfriendly intentions and resented the suggestion. Their Foreign Office consulted that of Russia and the two together rejected the American proposal doing so almost insolently.

At the same time the American Group of Bankers was formed at the suggestion of Mr. Knox for the purpose of making loans to China and obtaining concessions and railway contracts from her. Mr. Willard Straight, the American Consul-General at Mukden, received the appointment as China agent of the Group. Mr. Straight was at first inclined to test the exclusive railway claims of the Japanese and Russians in Manchuria, but a practical Chicago lawyer of mature years, W. J. Calhoun, sent by Mr. Knox to Peking as Minister, discouraged such ideas, contending that if American money were available (as it has never been) for the building of a railway in China, the road should traverse a thickly populated region where it would benefit the Chinese people rather than a comparatively barren territory where its main object was political.

Mr. Calhoun, while interested in the welfare of the Chinese people, was able also to see the points of view of other governments, and during his tenure of office (1910 to 1912) the American Legation co-operated valuably with those of other great Powers. The American Group of Bankers entered the Financial Consortium, which was designed to terminate rivalry among the principal lending

Powers of Europe,—Great Britain, France and Germany. Japanese and Russian groups were then promptly included, and competitive financing of China came to an end. This international agreement could only have benefited the Chinese, had they possessed a government capable of taking advantage of the sound and above-board financing that was offered; and the newly-proclaimed Republic, unable to obtain money from its own people except by the old practice of military exaction, was in sad need of honest foreign assistance. But in the course of the "fight" to obtain the recognition of American "rights" so much unfortunate publicity had resulted that many Chinese and many Americans had become suspicious of the motives of the "international bankers." It is unfortunate that American diplomacy is so often accompanied by unnecessarily harsh denunciations of others in the press and on the public platform. In this case the hope of getting orders for some millions of dollars of railway supplies was made to appear as a great international issue, although equally important competition between large American companies for sales within the United States is a monthly occurrence.

No American Government, Republican or Democratic, ever had a thought of going to war with Japan over any question, but our series of contentions with them by this time led the British Government to fear that the growing ill-feeling might ultimately result in such a thing, and in 1911 they began to make preparations, diplomatically, against the contingency. The terms of the Anglo-Japanese Alliance were revised, a clause being included in the new Treaty of that year providing that neither contracting party should be required to go to war with a third Power with which it had a treaty of general arbitration. Such a treaty was then under consideration between the State Department, and the London Foreign Office. The treaty failed of ratification by the United States; nevertheless, in 1912 the London Government notified that of Tokyo that in the event of war between Japan and the United States it would regard itself as having a treaty of general arbitration with us.

In 1914 the Japanese Government, again following the lead of Russia, declined a valuable American proposal. That was the Bryan Treaty of Arbitration, which was offered to many countries and accepted by most. Military influence was still high among the Japanese and our attitude towards them had not become less annoying. President Wilson and Mr. Bryan then appeared to them in the rôle of pacifists while their own leaders at that time, Okuma and Yamagata, were inclined to depend upon the force of arms.

Within two weeks after the World War broke out the Japanese Government, under the Premiership of Count Okuma, interpreted the Alliance with Great Britain as requiring Japan's participation, and the Japanese naval and military forces proceeded to drive another European Power out of the position it had established for itself in China. The Japanese, after summoning the Germans to surrender the leased territory of Kiaochow, blockaded that base by sea and landed an army on the north shore of Shantung to march a hundred miles across the province and attack the fortress from the rear. The Chinese Government protested but the protest was ignored. Having plenty of time, complete superiority over the German garrison and no fear from China, the Japanese took several months in preparing the attack, so that the capture should be accomplished with as little loss of life and property as possible.

While the Japanese army was conducting this campaign the Japanese navy proceeded to capture the island groups known as the Marianas, the Marshalls and the Carolines, which the American Government had neglected to take and the German had purchased from Spain after the Spanish-American war. None of these islands are of much actual value, but as their possession would take Japan closer to the Philippines and Guam, it intensified the anxiety of American naval men.

The M.S. "Sumire Maru"

The *Sumire Maru*, which is being built for the Osaka Shosen Kaisha, was launched recently from the yard of the Mitsubishi Zosen Kaisha. She is a sister ship to the *Midori Maru*.

Some Thoughts Concerning Economics in the Development of China

By Dr. J. A. L. Waddell

[Previous Chapters of These Memoires Have Appeared in Recent Issues of "The Far Eastern Review."]

VI.—Development of a Spirit of Patriotism in China

FOR any country truly to thrive and prosper, its citizens must be patriotic; and the more enthusiastically so they are the greater is likely to be the prosperity of the nation. Carried to the limit, patriotism means that one is always ready and glad to serve his country even, if necessary, by making the supreme sacrifice. This is an old fashioned idea; but it still prevails more or less in individual cases, as was shown conclusively in the World War by the unselfish devotion to duty of many men. For an entire nation, however, to be imbued with this spirit, as history tells us was sometimes the case, I know of but one instance in modern times; and it is rumored that even there such extreme devotion is on the wane.

The old principle "For country right or wrong" no longer governs—nor should it; because it is proper to-day for every right-thinking man, within legitimate limits, to express, both orally and in print, his views on subjects of national or even international import, provided that they be not anarchistic or (especially in time of war) traitorous. Without such freedom of speech progress would be impeded; and yet such liberty is too often taken advantage of by those whose nature is destructive rather than constructive. Many men are always ready to complain of existing conditions, but very few there are to offer remedies therefor; and, even when such are suggested, they are generally impracticable and absurd. Everyone should recognize the fact that nothing in this world is absolutely perfect because every action taken has good results for some individuals and bad ones for others, the criterion for "good" being the proportionate number of those affected favorably. If this proportion prove to be very large, the action is good and proper; but if less than fifty per cent., it is not; and if much smaller than that, it is unwise and bad. Everything in life is relative; and this axiom must be given general recognition, if peace and prosperity are to prevail.

Impetuous young Chinese should recognize the validity of this axiom, and should refrain from making too many adverse criticisms of the ruling powers. The National Government has on its hand in the pacification and rehabilitation of China an almost overwhelming task. It is doing its best, is accomplishing wonders, and is laying out a policy of reconstruction and development of stupendous magnitude and vital importance. It, therefore, deserves the active aid, and not the opposition, of every patriotic Chinese citizen. If such aid be given, or even if strict neutrality be observed, success will come eventually; but constant, carping criticism will retard the fulfilment of its endeavors, or possibly block them entirely.

Every energetic young man (or woman) in this country should consider it a bounden duty to back up the Government in its truly altruistic policy of working for the best interests of the nation. From what I formerly knew of the present Cabinet members, and from all I have seen of them since my return here, I am convinced not only of their patriotism and honesty of purpose but also of the soundness of the policy they have adopted and are adopting—especially in the Department that I am serving.

My advice to the people of China is to back the administration to the limit, and thus give it a chance to succeed in the praiseworthy policy that it has chosen and in the excessively hard work that it is undertaking. It would be absurd to expect it to be absolutely right in every detail of its procedure; for no human policy can be perfect—men can be far-seeing but never omniscient.

I am firmly of the opinion that, if the present governmental scheme for construction and reconstruction be followed judiciously and without serious interference, the living conditions in China a

decade hence will be wondrously changed and improved. Perhaps I shall live long enough to say "I told you so," but *quien sabe?*

My remarks concerning its being the duty of all good Chinese citizens to back the Government apply with special force to the engineers of the country; for it is mainly by the work of the members of their profession that satisfactory progress will be accomplished. It is an old saying and a true one that "It is engineers who make the world go around." Upon them depend primarily the comfort, happiness, and well-being of mankind, the advancement of science, and the progress of the world. Without them there would be stagnation, retrogression, and a quick return to the primitive. Therefore, I say to the Chinese engineers, and especially to the younger ones, "Take off your coats and get to work. Do not stand out for high position, large pay, or any special class of activity. Do whatever may arise in the line of duty, be it ever so humble in character."

Nothing that is to be done in engineering should be deemed *infra dig*; for, if everyone on a job should stand on his dignity and demand the enforcement of his imagined rights, how much progress would be made and how long would it take for completion? "Face" may be all very well in certain occupations, but it has no place in engineering. Of course, there is no economy in having high priced men make a practice of performing minor work; but when it comes to a pinch, a real engineer should be ready to turn his hand to anything, irrespective of any consideration of dignity. This admonition is given under the conviction that it is specially needed by Chinese engineers, because matters of dignity and precedent in this country are given more consideration than their importance justifies. Some self sacrifice on the part of Chinese engineers is going to prove necessary for the welfare of their country. The older ones who have retired from work after attaining a competence should give up their ease and inactivity and "get into harness" again; and the younger ones should relinquish "soft jobs" and serve in government employ, even for less compensation than that which they are now earning. Such would be true patriotism; and I am hoping that many cases of it will occur in the next few years, especially in the immediate future, because the demand for native engineers is soon going to exceed by far the supply.

My experience with the Chinese Students' Alliance in the U.S.A. has forced me to the conclusion that the modern Chinese youth is somewhat lacking in patriotism; for, in spite of repeated and appealing efforts, I was unable to awaken my hearers to a due realization of the serious condition existing in their country at that time (1923 and 1924) or to induce them as a body to do anything of importance for its betterment. Further investigation has led me to a confirmation of that general conclusion; hence I feel urged to appeal to the Chinese intelligentsia to give more heed to the welfare of the country and less consideration to their own personal interests. From what I can learn, the Chinese people are more loyal to family and community than to country. While family and community interests may be exceedingly important, those of country ought to be far more so; hence a change of mental attitude in this respect is urgently in order.

Hitherto in this paper I have been dealing mainly with generalities and with Chinese defects needing rectification; but my exhortations cannot be of much value unless they are constructive; hence it now behooves me to indicate how it is possible for some of the people of China to develop patriotism and put it into evidence in their daily lives.

Every educated Chinese should devote a portion of his time to such altruistic deeds as writing on matters of interest and value to the reading public, limited though that class of citizen be, lecturing on subjects of importance, studying how to establish schools

for the education of the masses, translating valuable foreign papers into Chinese and having them published, preparing codes of ethics for various groups of men and women, supporting the Boy Scouts movement, earnestly undertaking civic duties, holding public office, improving political conditions, and aiding with both time and money in famine relief and the suppression of begging. Medical men could devote some of their time to free clinics for the poor; lawyers could form clubs for the compilation and codification of just laws and directions for the governing and guiding of the populace; scientists could organize for the purpose of making investigations leading to discoveries that would benefit their countrymen; and engineers, both through their societies and by individual effort, could effect many improvements of living conditions and thus make their poorer countrymen more comfortable, happy, and contented. Professional men in all lines could give, free of charge, lectures to students in the colleges, universities, and other institutions of learning, teaching not only how to attain professional success but also how to lead happy and useful lives.

In short, all educated people should study how to improve materially the existing conditions of Chinese life and morals, and then endeavor strenuously and whole heartedly to put the results of their studies into practice.

VII.—Dissemination of Current News, Information Concerning World Progress, and General Knowledge

While the prime necessity in education for China is the instruction of the present illiterate mass of the populace, the needs of those who can read and write but are not highly educated must not be forgotten. It is essential that the minds of such people should be developed, and that they be introduced to the joy of interesting reading and the satisfaction experienced from the perusal of good literature. The gain from reading is by no means confined to the peruser; for it is likely to redound to the benefit of the nation, in that one who reads studiously a scientific article of useful intent is likely to see some practical application of its teachings that may lead to the pecuniary advantage of himself and, therefore, to that of his countrymen in general.

Again, a regularly acquired knowledge of world happenings has a broadening effect upon any individual; and if there be a large number of them thus broadened, the result to the nation as a whole will be quite material, especially if those thus benefitted endeavor to transfer a portion of such information to their neighbors of lower degree in the community, which, if they be patriotic citizens, they certainly ought to do.

Finally, if the people of China are daily informed properly of current events, they will not be so ready to heed disquieting rumors and to listen to the blatant discourse of chronic agitators and traitorous demagogues.

Such being the case, would it not be good policy on the part of the Government to establish a bureau for the systematic dissemination throughout the entire Republic, even to the furthestmost little aggregations of inhabitants, of the classes of information listed in the title of this memoir? If such a policy were adopted, great care would have to be exercised in order to prevent the power of the bureau from being abused (as is the case with the governments of some European countries, especially in time of war) by withholding information that it might deem inadvisable to put forth, thus actually enslaving the public mind. Everything of importance that is going on, both at home and abroad, should be told candidly to the people; but it would, of course, be permissible for the bureau when spreading disagreeable news, to comment on it and draw just conclusions concerning it that would reduce its tendency to inflame the people's minds by arousing their indignation.

Such a bureau, if judiciously and honestly operated, could wield great influence and accomplish grand results for the people of China. At first there might be a prejudice against it, engendered by chronic demagogues and agitators; but if these carry their pernicious influence too far, they should be "brought up with a round turn" by the firm hand of the law.

It might be that certain unpatriotic papers would refuse to publish the news furnished them by the bureau and use instead false material of their own, garnered by prejudiced and irresponsible reporters. In such cases perfectly legitimate pressure could easily be brought to bear on their unpatriotic editors that would result in either conversion to sanity or dismissal from office.

And now a few words concerning each of the three topics of this memoir.

The quality of the news furnished by most newspapers is far from being satisfactory; for the reader has to flounder through a lot of chaff in search of a little grain. Far too much trash is published, and insignificant and uninteresting events are given prominence, when they could be totally ignored without doing the slightest harm. The truth of the matter is that in most countries the sole business of many a newspaper is to make money for its owners and not to educate and expand the minds of its readers. The excuse offered for the poor quality of their stuff is that they aim to give what their readers desire, and that, if the public prefer to read trash and rot, they must furnish the mental pabulum demanded. The pursuit of such a policy greatly reduces the influence of the paper upon the mentalities of its patrons, and does not elevate the condition of the masses, as a good newspaper or periodical should do.

In general, it may truly be stated that newspapers are altogether too bulky, and that the effort to find something worth reading in them is often so great as to disgust the reader and cause him to give them but a cursory glance. The practice of starting a score of items on the first page and referring to various subsequent pages for their continuation paralyses one's interests and causes him to obtain his daily information by merely glancing at the headlines.

In compiling news for the Chinese people, a selection of material should be made on the basis of pleasing and satisfying the majority of thinking minds, at the same time keeping in view the object of educating them. It would be advisable to omit nearly all crime records, especially those of a sordid nature, also frivolous matters, such as games and minor social events. Psychologists recognize that wide-spread descriptions of crimes lead quickly to the commission of other similar offences—strange but true nevertheless! The main function of a newspaper should be the education of its patrons; and it should not make a practice of pandering to any of their depraved tastes, as too often they do in the U.S.A.

Arrangements should be made to have all the news-bulletins printed, as nearly as practicable, simultaneously in the different parts of the country. Distribution might be done by wireless, radio, multiwiring, or possibly some still better way, but not by ordinary mail, as that means is too slow for the purpose desired.

World Progress should form a special item of news; and it should be well digested and put into readable form. The compilation thereof should be done systematically, carefully, and thoughtfully, recording only those things that are of real importance; for the presentation should not resemble a Patent Office record, which is about the driest matter that can be found in print, but should be made truly interesting without sacrificing the attributes of clearness and reliability.

The leading Sunday newspapers of North America contain many articles of a scientific or semi-scientific character, written in a rather pleasing, popular style. These furnish information of value to many people; hence there the Sunday papers are much read and appreciated—not merely, however, for the class of articles just mentioned, but, it must be confessed, also on account of others written in lighter vein for the amusement and not the improvement of the reader.

It is only the serious articles in these Sunday papers that should serve as a type for the selection of material for Chinese reading—in fact, some of them might advantageously be translated directly. It would be unwise, though, to rely too closely upon American sources for this purpose, because much general knowledge can be gleaned from the papers and periodicals of both Europe and Asia. For this reason there should be on the Government's editorial staff men who have a good reading knowledge of the principal foreign languages.

VIII.—Economics of Labor for China

The economics of labor in China is truly *sui generis*, there being no other country in the world where the governing conditions are at all comparable, unless, in some respects, it be India, which, like this country, is over-populated. There are so many millions to be kept usefully employed that the introduction of labor-saving machinery will have to be done gradually. Any attempt to change

too quickly the manners and customs of the masses would certainly result in disaster. Nevertheless, many economic changes, sooner or later, will have to be made, if China is to take her proper place amongst the nations of the world. Instead of producing merely enough foodstuffs and manufactured articles for home consumption, she must produce much more, so as, by exportation, to bring money into the country for the purchase abroad of many things necessary to Chinese progress and development, which things she is not at present, and for some time will not be, in shape to manufacture.

To attain this end it is essential that individual efficiency throughout the entire country be augmented, not by working longer hours (for it is said that the farming class now labors almost to the limit of human endurance), but by employing better tools and some labor-saving appliances, and by studying and practicing in their tasks the principles of economics. Instead of working longer hours, the daily task-time should be shortened, so as to give the people opportunity for study and contemplation, thus rendering them happier and improving their living conditions.

The children, instead of working long hours in the fields and shops, should be sent to school and given there a sound elementary education, in order to make them useful citizens and thus uplift the nation. The good influence of such education on the development of China during a single generation would be simply incalculable. I do not, however, favor entire idleness for school children outside of school and study hours. A certain amount of play and amusement is essential for their well-being; but two or three hours per day spent on some useful and productive employment, involving no heavy burden, would do them no harm. This the Governor of one of the southern provinces of China proved conclusively when, not long ago, he put the school children for a short time per day onto the grading of some much-needed public highways. That official by so doing certainly proved himself to be a political economist of a high order.

Long hours of labor for children in the fields or shops, or too strenuous jobs of any kind, are not conducive to their welfare, either physically or mentally; but, as before indicated, two or three hours per day of suitable physical work would be beneficial rather than the contrary; for it would both develop their bodies and, at the same time, teach them that they must look forward to a life of work instead of one of mere amusement. Many children in America are being spoiled by the indulgence of their parents, who permit them to lead lives of leisure and enjoyment outside of school hours, and do not urge them to study hard.

Labor is the great thing in life, and instead of being a curse, as many unthinking people believe, it is truly a blessing; hence its pursuit should be encouraged in the young and forced upon the adults. Anyone who learns truly to love his work will have a successful career, unless something fortuitous of an unusual nature should prevent. This is an axiom that should be taught to all school children and college students, and that should be stated often in the public press and in lectures. If it were generally recognized, the output of the nation would be materially augmented.

There is a most fallacious notion in the minds of many workers that needs contradicting. If I am not mistaken, it is not unknown in this country. I refer to the thought that, if an individual work harder than the average and accomplish more, by so doing he deprives someone else of an opportunity to obtain employment. Such an idea is absolutely wrong; for throughout the entire world there is plenty of useful work to be done. If in any place there be apparently an over-production of any commodity, it usually indicates bad management; for the labor that produced it should have been employed producing something else of value that is salable either at home or abroad. If any country or community should find that its inhabitants are so zealous for work as to cause a general over-production of merchandise or food for which there is no demand, the hours of labor could readily be shortened, thus giving the people more leisure for mental development and for the rational pleasures of life.

But such a condition is not likely to occur in China for several generations; because the amount of work of all kinds that has to be done to put her in her proper place among the nations is stupendous, hence let every Chinese at once disabuse his mind of the erroneous idea that, if he work too much, he will deprive some fellow-man of an opportunity to labor for his daily food.

To what extent the piecework system is employed in this country I am not informed. It generally works well elsewhere; and, judging by what I know of the faithfulness of Chinese workmen, I would draw the conclusion that it might prove very successful here. Some employers claim that it has a tendency to reduce the quality of the output, for the reason that the workmen, in their haste to increase its quantity and thereby their own compensation, neglect to finish it according to specifications. There is some truth in this at times; but in such cases the blame lies with the superintendent who lets inferior work pass. If some of it were rejected occasionally and no payment allowed for bad work, the employees would quickly mend their ways and turn out satisfactory products.

The general working efficiency of the nation could be increased somewhat by the entire elimination of begging, which here is actually a profession. The *modus operandi* of suppressing it is quite simple—arrest everyone caught begging and put him or her on productive work for a long enough period to learn well some trade or occupation, then turn the offender loose after recording his or her thumb prints. If the person is again caught begging, the punishment should be of much longer duration; and a third offence should qualify the individual for life imprisonment at useful, but not necessarily hard, labor. The begging habit should be considered a disease—not a crime; and those afflicted with it should receive the same kind of treatment as do the actually insane.

From a perusal of the newspapers I note that the strike habit is making some progress here. This is a bad symptom; and the practice of striking should be suppressed with a firm hand, for it is contrary to all the principles of economics. If workmen have grievances (or think they have), let them present them formally to their employer with a request for reform; then, if he ignore them, let them bring their petition to the Government. As for that curse of the community, the walking delegate, the Irish-American employer's method of dealing with him, *viz.* expulsion from the works, or even from the community, *ri et armis* is most effective. Such troublesome persons are unworthy of any consideration, and if their feelings are hurt by rough handling, they should receive no sympathy from the general public, with whose economic welfare they make it their business to interfere, often with disastrous results.

The judicious use of criminals as laborers on public works, or on large private enterprises involving field construction, is a measure conducive to true economy. The somewhat popular idea among uneducated and unthinking people that criminal labor takes the bread from mouths of honest men is simply absurd. The criminals have to be fed and clothed at Government expense, therefore why not make them at least pay for their keep by enforced labor? They can do more than that by producing an overplus for sale by the authorities, the profits, of course, to go into the Government coffers. All the dirty, disagreeable tasks, the doing of which is essential to public welfare, should be allotted to criminals, thus relieving decent people from performing such objectionable work.

In handling criminal labor, it would be necessary to prevent escape. This could be accomplished by tattooing a record on each criminal's back with his jail number, as well as taking his thumb print. If it were generally understood that the capture of an escaped criminal would result in exceedingly severe punishment, there would not be many cases of fugitive prisoners.

In 1918 I wrote a paper entitled "The Engineering Profession Fifty Years Hence," which was delivered to several American technical societies and afterwards published in the *Scientific Monthly* and a decade later reproduced by Mr. Frank W. Skinner in his book of my "Memoirs and Addresses of Two Decades." The paper is divided into two parts, the first real and the second imaginary. The latter portion records the retiring address of the president of the American Academy of Engineers in the year 1968, in which address is covered the development of engineering during the preceding fifty years. From that address I quote the following:

"Some forty years ago when our standing army was finally reduced to a mere police force, the government recognized that some similar body was necessary in order to provide labor for the unemployed; hence it inaugurated the 'Industrial Army,' composed mainly of volunteers, but also having some regiments recruited solely from the hobo and the minor-criminal classes. These

men are drilled and trained in the lines of peace as formerly were soldiers in the lines of war, so as to make them effective. They are sent out on public works, and their services are occasionally loaned to the large contractors. They are paid monthly and are fed and clothed at government expense. Their services have proved of great value in agriculture; for, owing to their mobility, they are sent from south to north in the harvest season, then shipped south again and gradually moved northward so as to care for the plowing of the land and the cultivating of the crops.

"There are separate regiments for the different kinds of work; but in case of necessity, the character of the men's occupation is changed. The enlistment period is four years; and deserters are punished just as drastically as were formerly those from the military army and the navy.

"The establishment of this industrial army has proved to be a great boon to the engineering profession, in that there is at all times a certain amount of dependable labor which can be utilized on important constructions. Moreover, it tends to stabilize the price of labor, and thus encourages promoters and contractors to undertake great enterprises."

Would not this "Industrial-Army" scheme work out nicely in China, especially at the present time when there are so many idle soldiers to be maintained? If they were kept on without being disbanded and were turned over in squads to do public work, such as the building of railways, highways, drains, and other construction, they could be taught to labor efficiently; but their military discipline should be maintained, with desertion to be severely punished. The criminals could be put into this industrial army, but they should be kept separate from the other soldiers, as it would be unfair to the latter to force them to associate with such undesirables.

I am making this suggestion of an industrial army for China in all seriousness, although the original idea, evolved over a decade ago, was in the nature of a phantasy; for I consider it to be the best possible solution of one of the Ministry's most knotty problems.

The solution of the economic question "*Man Power versus Mechanical Power for China*" is a matter of exceeding difficulty; for it is dependent upon the fact that it is often necessary to provide paying occupation for indigent and even starving people. If money could be saved for the employer by using mechanical power instead of human labor, it would not be a truly economic policy, were so doing to throw a multitude of people out of employment. Again, what would be the best and most economic solution of the problem to-day might not be such a few years hence; as the governing conditions are subject to rapid change.

For instance, railroad grading can probably be done more expeditiously and inexpensively by wheelbarrows, by horsedrawn scrapers, or, in heavy work, by steam shovel than by hand-digging of the earth, depositing it in baskets, and carrying it to the dumping place; and a long haul by carts or by small cars on a temporary narrow-gauge track might figure much cheaper—than wasting in spoil banks practically all the material from the cuts; nevertheless, from a national economic view point, it would be better for a while to forget these possible savings and let the poor people do the grading in the clumsy manner to which they have been accustomed for generations, and in which they are proficient. But when it comes to compacting the earth by a heavy road roller, I would draw the line against hauling it slowly by man power, as it could be operated much more rapidly and economically by motor power.

No general rule can be given for solving this question of "*Man Power versus Mechanical Power*;" but each case as it arises must be worked out as a separate economic problem, with one's bias ever in favor of the multitude, provided that their methods of labor are not too glaringly uneconomic. As time passes, though, the governing conditions will be modified, and gradually labor-saving appliances and machinery will come into vogue.

IX.—Home Manufacture *versus* Purchasing Abroad

In respect to the question as to whether it is preferable to purchase necessities from abroad or to manufacture them in China there are many pros and cons. At the present time when money is so scarce here and so difficult to borrow from foreign countries, it is necessary in the cases of most articles to import; but later on, after the adverse conditions have been materially ameliorated, it will be well to start, in a modest way, their production at home.

It certainly would be to the advantage of China, if she were more independent of foreign countries—at least for the necessities of life, and eventually also for most of the luxuries. Of course, if the country is going to export largely of its produce, it will have to buy something in its stead, so as to utilize some of the money that will then flow in; but China could profitably stand for a period of several decades a moderate balance of trade in her favor. That matter needs no government regulation; because, as soon as there is an accumulation of money in the home banks, the wants of the people will naturally increase, and they will begin to consider as necessities many things that are now universally deemed luxuries—for instance, automobiles and even airplanes.

The establishing of home industries is generally a task for individuals or of aggregations of individuals in the form of companies or firms, and not for the Government; although in some instances it might be legitimate for the latter to subsidize an industry, in order to give it a proper start, with a cash donation, a short-time loan without interest, or a remission of taxes for a certain number of years.

In exceptional cases it might be necessary for the Government to build, equip, and operate a plant, if the product were essential to its activities, and if the undertaking were on too large a scale for Chinese private enterprise—for instance, smelters, rolling mills, bridge shops, car shops, locomotive shops, automobile shops, and airplane shops; but cement works, cotton mills, woolen mills, paper mills, wire mills, nail mills, creosoting plants, machinery shops, electrical-apparatus shops, paint shops, tool manufactories, and plants for other minor activities might well be left to private enterprise.

The increased tariff which has lately been put into effect should be a great encouragement to Chinese capitalists to invest their savings in new enterprises that promise large returns.

Any individual or company contemplating the inauguration of a manufacturing business in China should weigh very carefully all the pros and cons, in order to determine, as far as the limitations of human forethought will permit, the chances of success. Unless these figure out to be good, the enterprise under consideration should be abandoned; for any failure of an established business not only involves loss of money and hardship for many people, but also is inevitably a serious detriment to the general advancement of the country—especially in regard to the discouragement it involves for the introduction of foreign capital.

An economic study for the inauguration of any manufacturing project should include the following considerations:

First cost of the completed plant, and the annual interest thereon.

Cost of maintenance and repairs.

Cost of raw materials and the permanence of their supply.

Cost of manufacture in the shops.

Amount of taxes of all kinds—not only on the plant and its output, but also on transportation and sale of the product throughout the country.

Allowance for obsolescence.

Allowance for a sinking fund to pay off the principal of the money borrowed.

Reduction in output because of too many public holidays.

Contingency of strikes and the money losses involved thereby.

Loss from break-downs of machinery.

Possible reduction in the country's demand for the company's product.

Possible reduction in the import duty on articles of the kind manufactured by the company.

Possible establishment of rival companies, and their cutting of prices.

Possible rise in workmen's wages.

Possible increase in tax rates.

Possible decrease in cost of production abroad.

On the other hand there should be considered the following contingencies:

Possible decrease in cost of production due to increased skill of the workmen, and from the company's eventually sharing some of its annual profits among the old hands.

Greater demand because of improved conditions of life and owing to superiority of product over that of rivals, both at home and abroad.

Finally the patriotism involved in providing a new enterprise for the Republic and thus aiding in the augmenting of its financial and commercial importance.

If, after giving due cognizance to all the preceding items that are of consequence to the contemplated project, the result show a probable net revenue as great as fifteen per cent on the investment, the enterprise will be a safe one; if much more than that it will be gilt-edged; but if less than ten per cent, it will be of problematical value or even unsafe, because the element of contingencies has to be considered.

Among the previously-listed activities and numerous others not mentioned, there should be found many that are worthy of the serious consideration of Chinese business men and other citizens of a speculative turn of mind. Such people should not forget that it is an act of true patriotism to inaugurate, materialize, and operate successfully any enterprise that will enable their country to avoid the necessity of importing foreign goods of any kind.

In view of the cheapness of Chinese labor, the native intelligence of even the uneducated class, the thrift of the people in general, and the stick-to-itiveness of the workmen, there should be no great difficulty encountered by Chinese manufacturing enterprises in competition with those of foreign lands; hence the capitalists of this country should take heart and launch out into the manufacture of many things that China needs to-day, and which she is not in shape to buy from foreign countries.

Finally, let me offer a word of advice to those Chinese who undertake and succeed in building up good businesses—if the profits of your products be unreasonably great, cut down the selling prices thereof, so as not to make of yourselves profiteers and, consequently, unworthy and unpatriotic citizens.

The Trade of China

By Mr. Kenji Kodama, President of the Yokohama Specie Bank, Limited

THE following paragraphs are taken from the recent speech of the President, Mr. Kenji Kodama, of the Yokohama Specie Bank, Limited, at the Ordinary General Meeting of the Shareholders. Mr. Kodama, who is a specialist in Chinese affairs, very brilliantly analyzes trade conditions in this country, particularly as they relate to the Japanese trade.

Mr. Kenji Kodama's statement follows:—

"After hostilities of long duration the stage of reconstruction was entered upon, and, beginning with the removal of the Metropolis and the conference of high officials, many constructive measures were carried into effect, until at last the Five Council Boards were inaugurated in October 10, whereupon the establishment of the Nationalist Government was declared both at home and abroad and was soon recognized by the United States of America and Great Britain, other Powers following suit one after another. With the successful change of colors in Manchuria towards the end of the year, the unification of the whole of China was practically completed under the emblem of a White Sun in a Blue Sky, but there are still many difficulties to be encountered both internally and externally. Externally, not a few important questions are awaiting early solution, whereas internally, beginning with the disbandment of troops, readjustments in finance and administration also lie in their way. To make matters worse, the population was suffering from the burden of excessive taxation, and, to sum up, there are many difficulties and obstacles lying in wait for the Nationalist Government.

Foreign trade as a whole expanded greatly during the year in both inward and outward directions, exports amounting to 930 million Taels as against imports of 1,240 million Taels, with respective increases of 11 million Taels in the former and 227 million Taels in the latter over those of the preceding year, while the adverse balance reached 310 million Taels, the biggest recorded since 1921. This state of affairs is traceable to a recovery from the disturbed state of local transport facilities and to the renewed demand for commodities in the interior with the termination of war, the demand

for imported goods being so strong that merchandise of foreign origin poured into the whole of China in streams, with the sole exception of Japanese goods, which suffered owing to the severe and persistent boycott of them in force throughout China.

Economic conditions in the Yangtze Valley, with Shanghai as the center, blessed with favorable weather and subsequent bountiful crops, took a turn for the better, presenting a very brisk aspect, while exports increased in the half-year by 19 per cent, and imports by 55 per cent, as against those of the corresponding period a year ago. The money market at Shanghai, on account of the better outlook for the crops in the interior and the impeded circulation of inconvertible notes, experienced a substantial drainage of silver, first of all of 16 million Dollars to Hankow and afterwards to Tientsin, Tsingtau and Manchuria, but with the full replenishment of silver, 76 million Dollars being received from the United States of America, the market was not only able to withstand the pressure, but an easy tone prevailed, with the stock continuously increasing. This stock amounted at the end of the half-year to 65.6 million Taels and 99.5 million Dollars, showing gains of over 11.6 million Taels and 23.5 million Dollars respectively as compared with the similar period a year ago. Shanghai exchanges, reflecting the monetary state in Shanghai and the silver quotation in London, opened at 2s. 8 3/8d, following a generally weak tone, and closed the half-year at 2s. 7 1/2d.

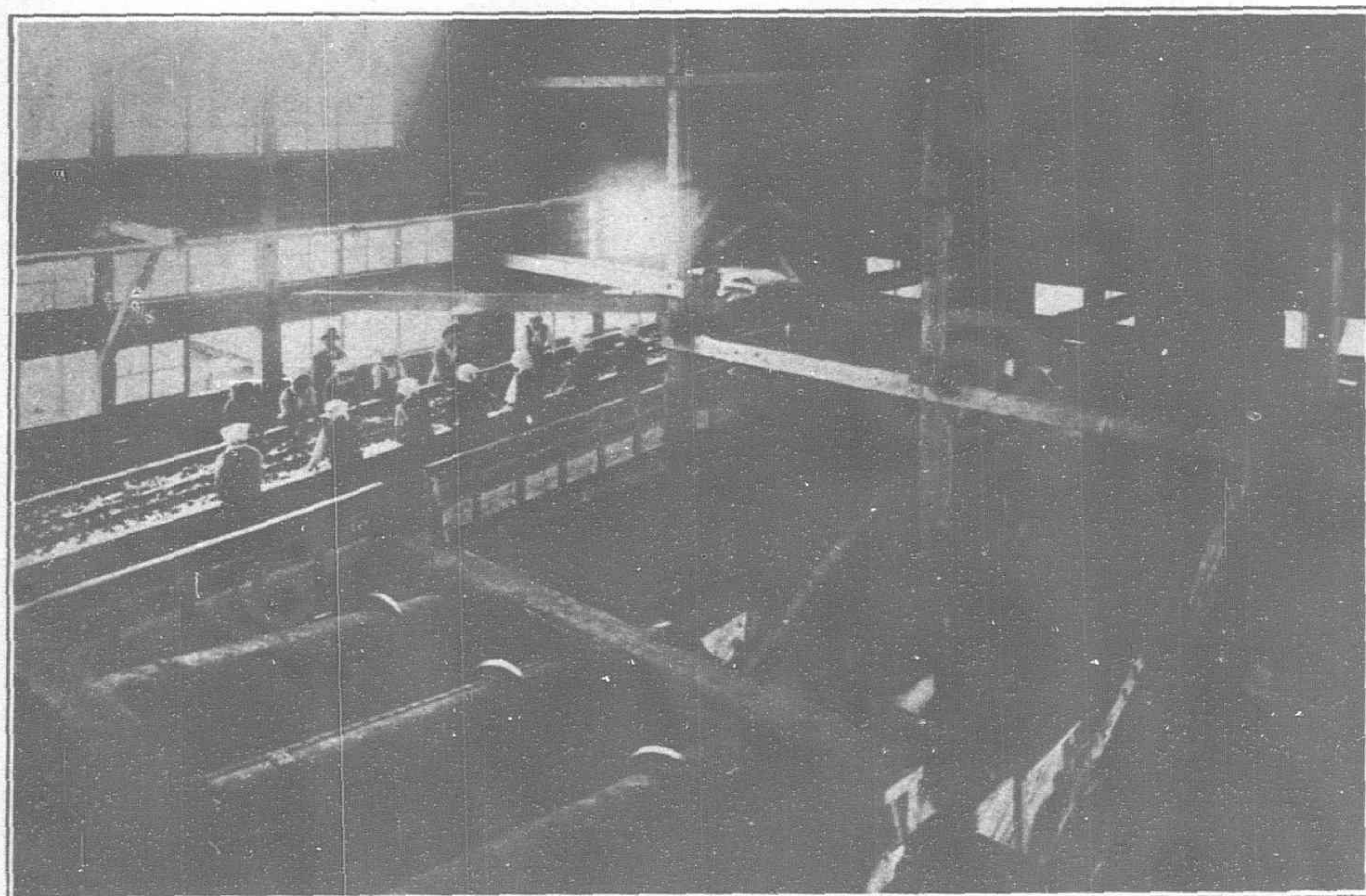
In northern China, Peking, consequent upon the removal of the Metropolis, assumed a desolate aspect, unemployment and the closing-down of shops following in rapid succession. In Tientsin, the stoppage of navigation on the Pei Ho through drought caused very severe dislocation to commerce, while railway transport facilities were not entirely restored to the normal condition. Financial circles sustained certain agitations owing to the bankruptcies of the Jui Sheng Hou and two other native banks and to the closing of the Exchange Bank of China towards the end of the year, all of which proved stumbling blocks to commercial transactions, but the termination of hostilities brought about a stability of public feeling, with the result that exports of cotton and bone meal compared favorably with those of the preceding year, while the movements of sugar and wheat flour, by far the biggest items in imports, were very active and showed increases by nearly 30 per cent. each.

In Shantung, the crops of cotton and pea-nuts were so favorable that it was anticipated they would show a brisk outlook at the approach of the autumnal demand, but affected by the persistent anti-Japanese boycott, their arrival on Tsinan market was greatly retarded and the volume decreased to such a degree that it scarcely reached half that of the previous year, while in the case of pea-nuts, suffering from the bumper crop in India, exports declined so severely that they fell short by more than 90 per cent. of the preceding year.

Reviewing next South China, political dissensions shifting to the center, tranquility prevailed in outward appearance, but owing to the Kwan-si Chet-kiang hostilities, as well as communistic manipulations, public feeling was much disturbed, while, in addition, on account of the poor crop of cocoons, the market in general was in a state of depression, and business in Hongkong as a reflex was by no means brisk. In Manchuria, last of all, Chang Hsueh-liang, succeeding his late father, took office as Commander-in-chief early in the half-year and declared his intention to establish a good administration, but pressed by straitened financial circumstances, was compelled to have recourse to the usual patching-up measures, such as, issuing indiscriminately inconvertible notes and by cornering staples through licensed merchants, with the result that both Japanese and Chinese staple merchants were in great distress. The output of beans in Manchuria for the whole year totalled 5,420 thousand tons, showing an increase of 500 thousand tons as against that of the preceding year, due partly to the bountiful crop in general, but partly to the increased acreage under cultivation in North Manchuria, owing to the vast army of immigrants into that region. Accordingly, the condition of the farmers was generally ameliorated, but on account of the long-standing misgovernment and the reckless issue of inconvertible notes, the import trade was not in the least encouraging. The bean-oil industry, one of the chief ones, suffered from inactive demand as the result of the gradual development of the oil industry in Europe and the competition offered on the part of chemical fertilizers in Japan, and was in a sad plight.

By J. Norman Wynne, F.G.S., M. Inst. M.M., Late General Superintendent of the Toi Gold Mining Co., Ltd., Japan

During the civil war which broke out in A.D. 1467 and continued until the ascendancy of Toyotomi Hideyoshi in 1587, the gold and silver output became the object of plunder sought for to fill the coffers of the warlords. It is recorded that in the years A.D. 1532 to 1554, the lord Takeda minted 144,000 oz. of gold into coinage, from the mines of Kai and Shinano. Copper production increased also during these years and various improvements were made in the smelting and refining of the metal. In the 16th



Coal Sorting and Washing Plant of the Shin Yubari Mine

century, a new process became general, taking the place of the method of first roasting and subsequent reduction of the ore. The preliminary roasting was omitted and the blast principle introduced.

During the 16th and 18th centuries, a big advance appears to have been made, and the output of all metals increased greatly. It is recorded that early in the 16th century, (Hideyoshi divided among his Samurai Knights) 21,588 oz. of gold and 154,713 oz. of silver.

It was early in the 16th century that the Toi gold-silver mines, situated in the Idzu Peninsula near Fuji-yama (in the management and reorganization of which the author has been for some years associated) were discovered. The official records of the township of Toi-Mura give most interesting accounts of the early working and production of these mines, which were at one time a convict settlement. A quaint standard of prosperity is noted in the record that the main street was called the "Way of Gold," and no less than 800 courtesans resided therein. Monuments erected to the memory of the manager and his wife, 350 years ago, with an inscription setting forth his successful management, are still in existence.

These mines were first worked from the outcrops and the writer has seen some of these workings carried down no less than 280 ft. below surface. The stoping would satisfy the most exacting "clean reef" miner, many of them being 15 in. and less in width. They were mostly worked in steps, but ladder-ways made from notched tree trunks were also used. These early miners were certainly no fools, and any reef left behind in their workings was invariably found to be profitless. Dozens of hollowed-out andesite boulders, about the size of a man's head, are to be found in the neighborhood, these were used as mortars in which samples of ore were ground preparatory to panning in shallow lacquered saucers, to ascertain the value. Most of the quartz in this oxidized zone was very decomposed.

In A.D. 1601, the Sado gold mine was discovered, and this has been worked continuously until the present day. This mine is now well over 1,000 ft. in depth, and extends along the strike over 8,000 ft. In these early days, prisoners convicted of capital offences were put to work the well-bucket used for hoisting water. The primitive hand pump known as "Supondoi" was introduced in A.D. 1634. This consisted of a wooden pipe, four inches square, and some 12 ft. in length, in which worked the wooden piston, a valve being fitted about three feet from the mouth. This type was later superseded by the archimedean screw, built entirely of wood about

nine feet in length, and arranged in stages. The remains of such a pump, lately found in old workings, is in the custody of the Tokyo Imperial University. Gradually the idea of driving drainage adits grew, and one 948 ft. in length was started in 1629. In A.D. 1782, a hand pump of Dutch design was imported and, it is said, resulted in a saving of £700 per annum.

The most interesting mine plan of the Sado workings, plotted in 1695, is preserved in the Imperial University, and is notable in that it combines the topography of the district, sketched over a longitudinal section. In the surveying of this plan, a magnetic compass of heavy brass, combined with a clinometer, was used. It is graduated into 480 degrees, and each degree into 10 minutes. The clinometer is divided decimally.

The Province of Satsuma, in Kyushu, became famous also about this time, and some 31,000 oz. of gold were produced annually.

During the 16th century, the Portuguese and Dutch vessels constantly visited Japan and carried away large amounts of gold and silver. At that time, for trading purposes, one ounce of gold was regarded as equal in value to 14 ounces of silver. It is recorded that during the 164 years

from A.D. 1601 to 1764, no less than 3,763,572 oz. of gold and 135,768,918 oz. of silver were exported from Japan in this way.

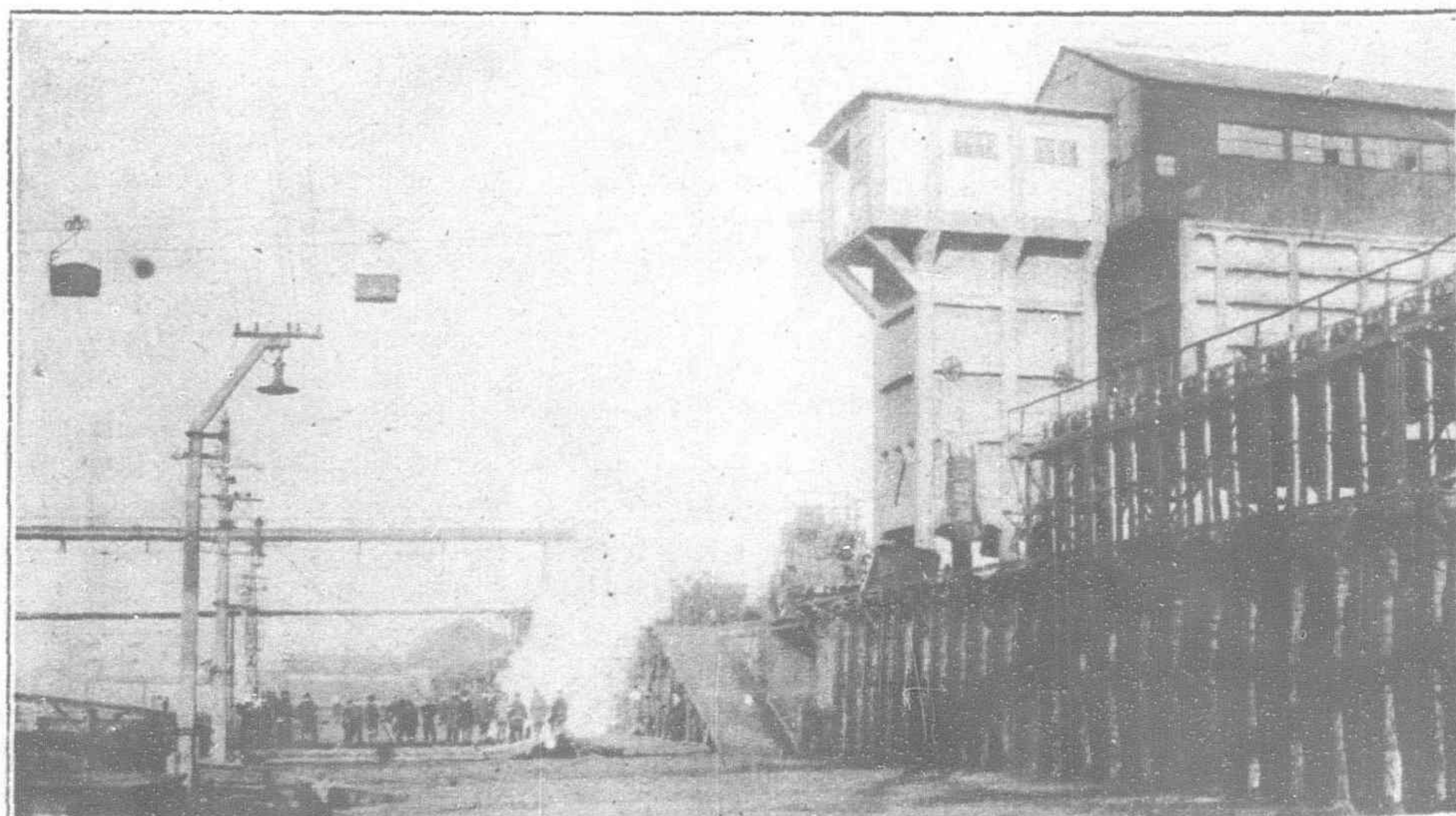
The auriferous silver was smelted with sulphur, producing silver, sulphide. Lead was introduced and the charge cupelled. Common salt was added before a further roasting, followed by washing to separate the silver chloride from the gold, the silver chloride being afterwards treated. It is stated that the bullion contained 99.54 per cent. gold.

In A.D. 1690, the well-known Besshi copper mine was discovered, and its first annual production amounted to 168 tons. Up to the year 1910, this mine had produced over two million tons of copper, and its ore reserves to-day are stated to be beyond estimate.

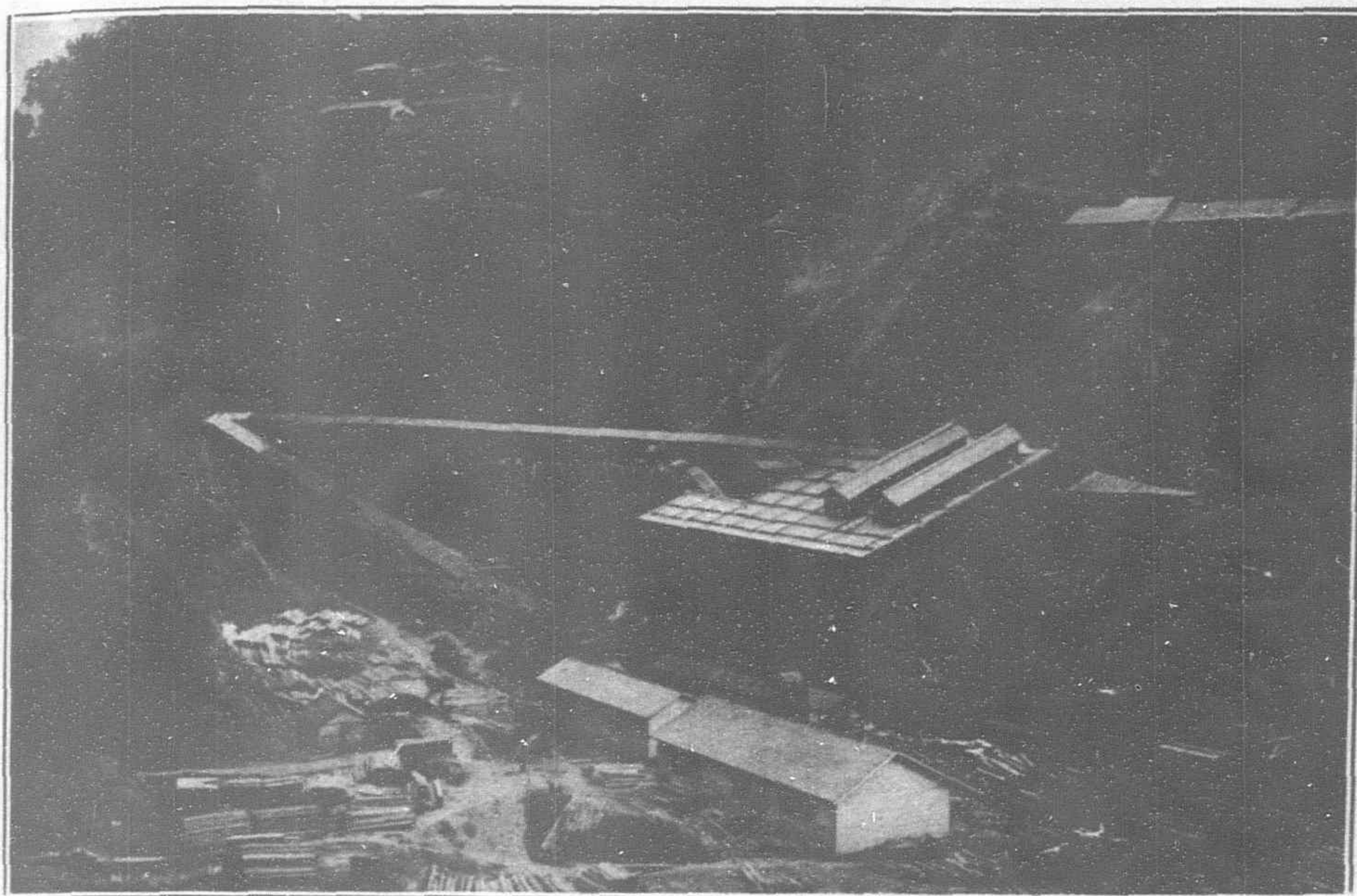
Gunpowder was introduced by an American engineer in 1863, bamboo reeds being used as fuses.

The discovery of coal was made early in the 17th century, and work was confined to the outcrops, but in 1867 the Takashima colliery adopted the European systems.

The civil disturbances during the Tokugawa Regency, which ended in the Restoration in 1867, interfered greatly with the mining industry, and many mines appear to have then ceased working, and have not since been restarted. After the Restoration several of the more prosperous mines were placed under Government control and funds were provided further to develop them. During the reign of Emperor Mutsuhito, (Meiji Era, 1867-1912) the founder of modern Japan, considerable attention was paid to the technical side of mining, and an engineering college was established. In 1877, a course of mining was instituted at the Tokyo Imperial



Miike Chobai-Coke Works at the Miike Colliery



Coal Sorting and Screening Plant of the Futamizawa Pit of the Manji Mine

University, and since that time has graduated a great number of mining engineers.

Hydro-electric power was introduced in the Ashio copper mine in 1889, and this cheap motive force has played an important part in the nation's development of mining. The bessemerizing method of copper smelting was introduced in 1890, with far-reaching results. The cyanidation process was adopted in 1897, and this again marked another step forward.

Present Day—Gold

As the reader will have gathered, gold and silver deposits are widely distributed throughout Japan and Korea, and the latest returns show that no less than 529 gold-silver claims are officially registered with the Bureau of Mines. Of these, only sixteen are in what may be termed a productive state. The principal of these, in Japan proper, are in the order given:—the Taio and Kushikino mines in Kyushu; the Toi mines in the Idzu Peninsula; Sado, on the island of the same name, off the west coast; and the recently developed Konamai, in Hokkaido. The last-named produces about 23,000 oz. gold and 60,000 oz. silver annually. The mines of Korea will be dealt with separately.

The first and third of these gold mines mentioned above are interesting as having been brought to their present importance by British and American staffs, under the management of Mr. Han Hunter, A.R.S.M., Assoc. Inst. M.M., the consulting mining engineer of Tokyo. The Taio mines responded well to development along modern lines, and have

for the last eight years paid over 30 per cent. dividend. This property has now been acquired by the Kuhara Copper Mining Corporation, a Japanese concern, which also controls a number of smaller gold mines, as well as several well-known copper properties.

Some of these gold mines ship their ore to the leading copper smelters, who utilize the quartz as a flux and the fines as lining in the converters. These custom smelters stipulate that the ore shall contain not less than 83 per cent. silica. In addition to the nominal smelting charge per ton, a varying percentage of the metallic content is deducted, based on its richness. On an average a 94 per cent. extraction is returned on ore with a tenor of 12 dwt. gold and 82 per cent. of the 8 oz. of silver per ton. The silver mostly occurs as argentite (Ag_2S) and occasionally as proustite ($3\text{Ag}_2\text{S} \cdot \text{As}_2\text{S}_3$). Several beautiful crystals of the latter were found by the writer.

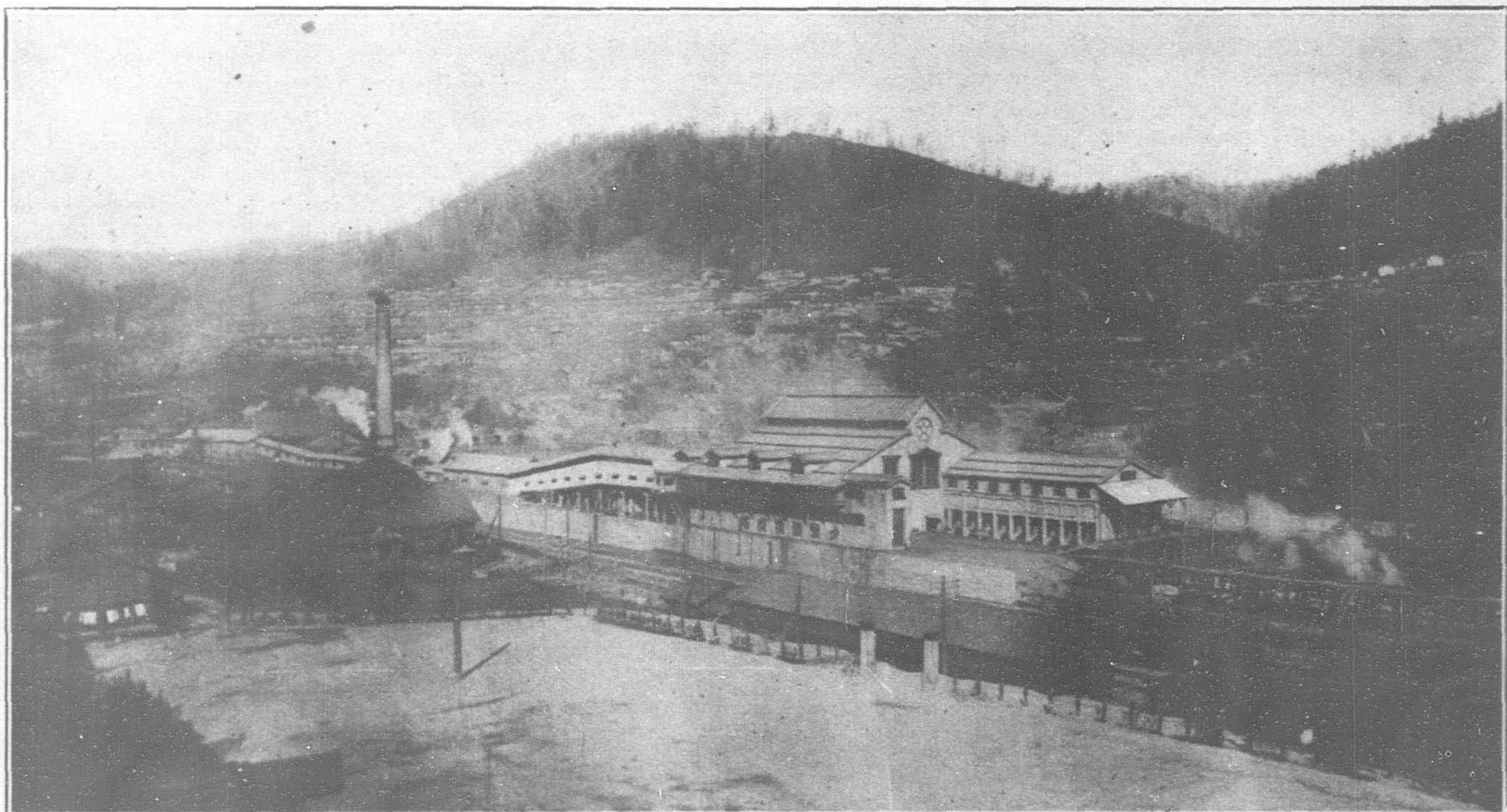
The ore occurs in lenticular masses and is generally spotty in character. Bonanza ore is met with in zones of secondary enrichment, and often carries exceedingly high values. The average tenor of good-silver ores is about \$15 a ton, and the ratio of silver to gold usually ten

to one. This ratio holds good even with extremely high gold values. The veins are mostly nearly vertical in dip.

In view of the encouraging results shown, it is difficult to understand why more is not done to develop some of the more promising of the five hundred known deposits. The writer is of the opinion that many of these could be turned into paying concerns.

As one might expect, these gold-silver veins occur in mountain masses, and are worked by adits and with the exception of Kushikino and Sado, few have reached any great depth below adit level. Many of the mines in ancient times were worked down to adit level; water difficulties were then encountered and, having no adequate pumping appliances to cope with these, they were then abandoned.

When the writer took over charge of the Toi mines, he found that some years previously two shafts had been sunk to 150 ft. below adit, and cross-cuts driven to intersect the veins. On cutting these, however, the small pumps used were speedily overcome, and the shafts flooded. It was obvious that the ore deposits should be developed in depth, and with a view to unwatering the shafts



The Main Pit of the Yubari Colliery of the Hokkaido Tanko Kisen Kaisha

as a preparatory step, a "Deep-well" type pump was purchased from the Byron-Jackson Pump Co. of San Francisco. This had a capacity of 70 cu. ft. per minute, and was driven by a 40 h.p. motor. This pump consists of a six-stage vertical turbine element, the vertical motor the bedplate of which was secured to heavy baulks fixed across the shaft, and the driving shaft, enclosed within its casing, fitted with phosphor-bronze bearings throughout, and this again enclosed within the eight inch diameter delivery main. The shaft casing is held in its central position in the eight inch pipe by spider clamps. The shaft, correctly threaded, casing, and main was supplied in 12 ft. lengths, which are easily connected to form the complete column. The turbine casing, carrying the runner shaft and runners, is fitted with phosphor-bronze bearings, and the spindled end of the turbine shaft is sealed in its bearing by a sand cap. A thrust-bearing is fitted on the top section of the main shaft, which prevents any damage to the motor. The motor was supplied by the General Electric Co. of America, and the starting gear includes under and over voltage relay protection, which was found very effective. This pump was simple to instal. The shaft having been cleared of any obstacles, a block and tackle was suitably fixed in the headgear. The turbine element, fitted with wind-bore, but no check valve, was brought into the desired position in the shaft compartment. A 12 ft. section of shaft-casing main was then connected up by screw couplings, and lowered. Each section was then connected in turn and lowered until the pump had reached the required depth. The last section was then connected up to the motor shaft, care being necessary in the adjustment of the thrust-bearing, and the work was completed. A water jacket is supplied round the bottom motor bearing, and is automatically fed with water as long as the pump is in operation. No priming is necessary, and on starting the motor, the water is forced up the main, without coming into contact with the protected shaft. Lubrication of the length of shafting is by means of drip feeds, the oil being fed through a pipe, $\frac{1}{2}$ in. diameter, to the bottom bearing. The bottom spindle-bearing of the pump was, as stated, sealed, and this was packed with grease before lowering. The writer found that this bottom lubrication was not perfect, and added a force-feed lubricator which fed grease through a four ft. length of piping. This, of course, could not be used until the water had been lowered till it stood some three feet above the top of the turbine casing. The shaft sump below the 150 ft. station was partially filled with broken rock, and the top of the pump casing stood some two feet below the level of the station. The writer has gone to some length in describing this pump, as it was found so satisfactory for unwatering these shafts, and his experience may prove of benefit to others. This type of pump is now made for heads up to 600 ft. The great advantages are that, once lowered, it requires no attention other than that of the motor man, and cannot be lost by flooding due to stoppage of power.

The electrical supply to these mines was very unreliable, and sudden shut-downs, without any warning, were frequent. It must be understood that the cross-cut mentioned had merely broken into the reel and it was obvious that the influx of water would be considerably increased as soon as driving was started, necessitating a far larger pumping capacity than 437 gallons a minute. It was also imperative that any pumping installation should be rendered safe against flooding. Water-tight bulkhead doors, built to stand 90 lb. to the square inch, were built into heavy reinforced concrete buttresses in the cross-cuts, and were designed to allow of instant closing in case of necessity. Twelve-inch pipes, fitted with stop valves were built into the buttresses, and air-escape valves fitted. These steel bulkheads were made to drawings supplied by the Osaka Iron works, a ship-building firm, and were in every way satisfactory. The doors closed on steel frames, fitted with heavy rubber insertion to render them water-tight and were supplied with a man-hole. In the meantime, a pump station with large storage sump was cut and three horizontal turbine pumps, each of 100 cu. ft. per min. capacity were installed. These were direct-coupled to 50 h.p. motors, of General Electric make, and were supplied by the Byron-Jackson Company. They are known as "Type S," and gave excellent service. It is possible, with these pumps, to remove the cover, uncouple, take out worn runners and shaft, and replace with a new set in just over ten minutes. The electric supply of these mines has lately been considerably augmented and over 1,000 k.w. is now on the switch-board, and the scheme of development in depth, including the sinking of a shaft in the center of the property to 500 ft., outlined by the writer, is now in hand.

Many of the other known mines, which have been abandoned for the reasons stated, would, in the writer's opinion, well repay development in depth, on similar lines.

Copper.—The copper output is the principal one, and amounts to over 70,000 tons, valued at £5,000,000 annually.

The Kuhara Mining Corporation operates mines at Hitachi in Ibarakiken, and the Kaspan mine in Korea, and owns large copper refineries in Saganoseki and Hitachi in Japan, and at Chinnampo in Korea. This Corporation has a capital of £7,500,000 and pays a dividend of 7 per cent. per annum.

The Sumitomo Corporation owns the famous Besshi mine, and operates the smelting works situated on an island in the Inland Sea, a conspicuous landmark. The annual output of electrolytic copper amounts to some 13,000 tons. A cross-cut 15,167 ft. in length acts as a drainage and haulage adit.

An excellently equipped concentration plant has been completed recently at Miihama which includes the latest types of jigs, tables, and flotation cells.

The Furukawa Company owns fifteen copper mines, and also smelters. Among these the principal producers are Ashio, Furokura, Midzusawa, and Kune. The refineries are situated at Nikko and Midzushima. Some 20,000 tons of copper are produced annually.

As already stated, the most important copper deposits exist in veins, contact-metamorphic deposits, metasomatic deposits, and beds. Of the 53 principal copper mines, producing 80 per cent. of the total output, 32 are of the vein type, 11 bed, 7 contact deposits, and 3 metasomatic. The commonest form of the ore is copper pyrites, and averages about 3 per cent. These mines are excellently equipped.

Coal.—This forms a valuable item in the mineral resources of Japan, and with an output of over 32,000,000 tons, ranks next to copper. Although not of first-class quality, it is satisfactory for general industrial purposes. The principal coal fields are in Kyushu, Hokkaido, Honshu, and Sakhalin. The Fukuoka prefecture in Kyushu is by far the most important, and is some 135,000 acres in area. The Miiki coal field also lies in this Province and consists of six collieries. These collieries are well equipped, and are noteworthy owing to the rarity of fire-damp. The influx of water in these collieries is very heavy, and is estimated at 1,300 cu. ft. a minute. The pumping system is probably the best in Japan, and includes a number of very fine electrically-driven high-duty pumps requiring over 20,000 h.p. The Tadakuma colliery has an output of 400,000 tons annually.

Hokkaido ranks second, and embraces seven or eight fields. Here the coal is of the bituminous variety, and cokes well. They are worked by the pillar and room system. These mines are considered the most fiery in Japan.

In Honshu, the principal fields are those in Fukushima and Ibariki, Yamaguchi and Wakayama Prefectures. The coal won in the first two named districts is mostly an intermediate variety between lignite and bituminous, and is a poor coker. The latter district supplies coal of an anthracite variety, which is said to have a very low percentage of slack.

The half of Sakhalin, which was ceded to Japan after the Russo-Japanese War, is known to have extensive deposits of coal of both lignite and bituminous varieties. All the Japanese coal fields are Tertiary, and in sandstone and shale, probably of Eocene-Miocene Age, which, in many cases, have suffered from tectonic disturbances.

Petroleum

A small proportion of the crude oil used is produced within the Empire, and the growing use of oil for naval purposes has led to increased activity in the development of known, and prospecting for other, fields. It is difficult to obtain reliable data concerning production. The Province of Ichigo is by far the most important supplier, but new finds are reported in Hokkaido and Sakhalin. Boring is carried on by the American rope system, but the type of boring which is commonly seen used for boring for "hot-springs," known as "Kadzusabori" is still used in places. This outfit consists of a bamboo, the elasticity of which is utilized as a working-beam. The drilling cable and sand-line are formed from lengths of split bamboo, joined by a very efficient splice. A wheel, some 12 to 18 ft. in diameter, is built of bamboo and wood, rotating on a wooden axle. On this wheel the length of bamboo line is wound, and the wheel rotates as required. A platform is built on which stand the drillers. This crude apparatus is nevertheless efficient, and has

the merit of being very cheap. In favorable strata, wells are carried down over a thousand feet. Usually three or four men form the crew of such an outfit.

Industrially, Japan is fortunate in possessing such a large and cheap supply of hydro-electric power, and as yet, the number of Diesel and semi-Diesel type engines is relatively small, though several of them have been installed in Hokkaido.

Tin

The output of tin has been insignificant, and the known mines are practically all in Kyushu. It occurs as cassiterite, and in most cases is associated with sulphides, such as pyrites, pyrrhotite, blende, and arsenopyrite, with some scheelite and wolframite. Japan imports annually a large quantity of tin from the Straits, and the recent successful developments of the Toyo tin mines will, no doubt, focus attention on other known deposits. The Anglo Oriental and General Investment Trust last year formed a company known as Toyo Tin Ltd., to acquire and operate the mines known as Mitate, the shares of which are on the London Stock Exchange. These veins were worked some three hundred years ago by the ancestors of the present Daimyo, Viscount Nieto. The mine consists of workings on two veins known as Mitate and Obuki, the ore deposits being formed along the contact of the granites with the sedimentaries, the limestone forming the foot-wall. The average dip of these veins is 80°, and they average about five feet in width, although varying considerably and reaching over 20 ft. in places. This property, when acquired by Mr. Hans Hunter, was equipped with a small mill able to treat some 30 tons daily. A new mill is now under construction, which will deal with 6,000 tons a month. A cross-cut 1,800 ft. in length is being driven to intersect the Mitate vein at a lower level. So far, all the workings are by adit, which will reduce pumping and hauling charges to a minimum. The ore reserves are reported to be 186,000 tons, assaying two per cent. tin oxide, classed as "positive," a 2½ years supply for the new mill. A further 290,000 tons is classed as "probable." Some difficulty was experienced in concentration, but this has been overcome satisfactorily, and with only the small existing mill, some 900 tons a month have been crushed, with an average output of 13 tons of concentrates, during the months April to June, 16 in July, and 22 tons in August. Recent developments are reported to have been satisfactory, and the future of the mine should be bright. The mine is under the management of Mr. G. W. Thomson, who was for some years on the Pahang Consolidated Co's mines in Malaya, and Mr. E. T. McCarthy is consulting engineer. An interesting and full description of the Mitate mines was given in "The Mining Magazine" of January, 1928, by Messrs. A. R. Weigall and G. W. Thomson.

Zinc and Lead

These metals are not worked to any great extent, although a few small mines are producing. The zinc-blende is usually very ferriferous, and associated with galena and chalcopyrite. It is probable that some of the deposits could be worked if the price of metal were higher.

Iron

Magnetite, hematite, limonite, and iron sands are found in Japan, and are widely distributed.

In the 34 years from 1874 to 1908, the production of iron increased from 4,817 tons to 183,000 tons yearly. To-day Japan's steel works turn out some 685,178 metric tons of pig iron and 1,102,883 metric tons of steel products. This, however, does not by any means suffice to keep pace with the growing consumption, and large quantities of iron and steel are imported, India being an important supplier.

Up to a few years ago, Japan purchased, chiefly from British shipyards, all her mercantile and fighting vessels, and the armament of the latter. With their marvellous ability to imitate, the Japanese, however, began to build the smaller vessels on her own stocks. Larger vessels were then attempted, and to-day she builds the whole of her navy, which ranks third among the Powers. Some excellent liners have also been turned out, and the Japanese mercantile flag may be found in every port. As mentioned elsewhere, a considerable amount of electrical plant, as well as machinery of all kinds, is being produced in her own works. Most of the locomotives and rails on the Government Railways are of foreign manufacture, but

a start has been made to supply her own requirements. A large number of steel girder bridges span the numerous rivers, several of them being noteworthy structures. Re-inforced concrete has been found to withstand earthquake shocks well, and is now extensively used for all large buildings, bridge-piers, etc. It will thus be understood why the iron deposits of Japan are insufficient to supply the ever-increasing demand for iron and steel.

Other Metals and Minerals

In addition to the minerals mentioned, Japan produces a fair amount of sulphur, and although this production is far below that of Italy and the United States, it ranks third in the world's supplies. The volcanic nature of Japan leads to the deposition of this mineral, and sulphur exhalations are common. Hokkaido is the principal producer, and it is noteworthy that on the inner side of both the north and south Japan arc and Sakhalin no sulphur deposit of any importance has been found.

Among the less important minerals are manganese, mercury, bismuth, graphite, asphalt, molybdenum, antimony, and kaolin.

Activities Abroad

The growing demand for various metals, principally iron, has made it vitally necessary to seek elsewhere for adequate sources of raw material, as near her own shores as possible. Attention has been turned toward Manchuria, China and Siberia.

The victory over Russia brought Japan the Russian rights in Manchuria, including control of the South Manchurian Railway, which runs from Port Arthur to Harbin. Notable iron fields are being operated in this region, specially at Anshantien and Panshihu, and considerable coal is mined at Fushun.

Japan's claim to the mining and railway rights, previously held by Germany, in the Shantung Peninsula in China, was upheld under the Versailles Treaty. In 1922, however, Japan agreed with China to withdraw from the territory, which was handed back to China.

It is known to the writer that important mineral concessions have been granted in Siberia to Japanese corporations, and it is probable that Japanese activity will be noted in this region in the near future.

It is understood that arrangements have been made by a Japanese corporation for the supply of large quantities of iron ore from the Yampi Sound, in North-West Australia. The contracts quoted by "The Mining Magazine" some time ago call for 150,000 tons in the second year, 500,000 tons the third year and ultimately 1,000,000 tons annually. This supply will prove a valuable industry for Australia, and a big contribution towards Japan's needs.

Korea

Practically the whole of the foregoing observations have been confined to Japan proper. But the Peninsula of Korea, or Chosen, Land of Morning Calm as it is known officially, is of importance in a survey of the mineral resources of the Japanese Empire. However, as Korea was, prior to 1905, outside the Empire, it is perhaps better to study its resources separately.

Following the defeat of Russia by the Japanese, a Protectorate was established in 1905, and the peninsula was finally annexed in 1910. The country possesses many precious and useful metals, but prior to the granting of a Concession to an American subject, James R. Morse, in 1896, little had been done to exploit these.

The granting of this Concession was followed by similar grants to Russians in North Hankyung Province, one to Germans in Kangwon Province, and one to Englishmen in South Pyung-an Province. These Concessions were, however, abandoned later. At the time of the new régime, the Unsan mine and Suan mine in Whanghai Province, the Chicksan mine in south Choongchung Province, a Japanese Concession, and the Changsung mine in North Pyung-an Province (French), alone were being operated, Unsan mines being worked by the Oriental Consolidated Mining Co. The above-mentioned are all gold properties.

Previous to the Japanese régime, mines were under the control of the Minister of Agriculture, Commerce, and Industry, and this control appears to have been unsystematic and thoroughly unsatisfactory. New mining laws were framed by the Japanese and conditions bettered.

Prince Ito, the first Resident-General, was favorably disposed towards foreign investment and he granted an exemption from duty on imported mining plant and machinery. Some 270,000 acres of mining land were granted as Concessions for the winning of gold, silver, copper, graphite and coal.

The annexation having changed conditions considerably, the mining laws were modified in order to bring them into line with the laws holding throughout the Japanese Empire. Among the changes made was the prohibition of foreigners from acquiring any new mining permits in Korea, except in the case of corporations organized by foreigners as Japanese legal entities. Concessions previously granted by the former Korean Government were, however, not interfered with.

The Japanese themselves were operating as early as 1907 an anthracite property some 32 miles in length and $7\frac{1}{2}$ miles in width near Pyengyang, and the product of this field is chiefly supplied, as briquettes, to the Japanese Navy. Two hundred million tons are reported to be contained in this Concession. An analysis of this coal shows volatile matter, 7-20 per cent; coke 70-90 per cent; and ash 4-15 per cent.

The premier iron mines in the Whanghai Province were put under Japanese control and they supply ores to the Government Edamitsu Foundry.

In 1911, other Japanese activities began, and the Mitsui and Mitsubishi Corporations started operations in iron production. The Furukawa Copper Company took up a gold concession, the Meiji Mining Corporation a large coal field, and the Fujita Company a zinc property.

The Chosen Syndicate, Ltd., with British and American staff under the management of Mr. A. R. Weigall and with Mr. E. T. McCarthy as consulting engineer, is operating successfully. The mines are situated near the Yalu River, the boundary between China and Korea, and comprise two areas, namely, Kappam, the northern, some 60 square miles in area, and Taiyudong, of 90 square miles, and lying about 20 miles apart. The southern area adjoins the Concession worked by the Oriental Consolidated Company. The Great Nurupi mine in the Taiyudong area has ore reserves amounting to 183,000 tons averaging 8.3 dwt. and reports developments appear to be good. The treatment of the ore from these mines gave considerable trouble, but it is understood that the difficulty has been solved successfully by the addition of floatation treatment.

The Oriental Consolidated Co., holding a concession of some 600 square miles in the Unsan district, is operating the Tabowie, Taracol, and Chintui gold mines, and produced in 1927 gold to the value of \$953,900. The ore reserves are estimated at half a million tons, valued at \$2,360,000.

Korea produces over half the total gold output of the Japanese Empire. A large number of small mines, both vein and placer, are worked by Koreans and Japanese. The Kuhara Copper Company has a large smelter at Chinnampo, where the output of many of these mines is smelted on a custom basis. The largest output recorded was in 1916, when the value reached £1,547,000. The Bank of Chosen has a vital interest in the gold industry, and collects about 80 per cent. of the bullion produced. Some three thousand mining permits are officially registered.

The Kaspan copper mine was first owned by the Collbran-Bostwick Development Company, but in 1916 was acquired by the Kuhara Mining Co., and operations are now on an extensive scale.

A zinc mine, known as Somindong, is being operated by the Fujita Company, and in addition smaller quantities of graphite, tungsten, chromium, lead, and pyrites are produced in the country.

The Korean is, on the whole, a good miner, though inclined to be lazy, and is kindly disposed towards Europeans. Like the policeman's, the Koreans' lot has not been happy and their history is a troublous one. They have in turn been exploited by Mongols, Chinese and Russians and having lost their measure of independence, are now subject to the Japanese Government. The Japanese have gone to great lengths to pacify them and improve their conditions, but they still smart with wounded pride at the loss of their independence. Schools, hospitals, and charitable institutions have been established, and it is hoped that in time the Koreans will accept in peace and tranquility their latest masters.

Hydro-Electric Power

In the year 1867, it is said that there was not a single steam boiler in Japan. To-day, the motive power in the mines alone

must be over half a million horse power, of which, however, a large proportion is hydro-electric. The mountainous nature of Japan lends itself to the development of hydro-electric power, and this has been fully realized by the Japanese. One of the first things which strikes the visitor is the universal use of electricity, and transmission lines are seen on all hands. Even the small villages are supplied with electric light.

In 1924, two hundred million pounds capital was invested in the 722 hydro-electric undertakings, and the output of these amounted to over one and a quarter million kilowatts. Some half million kilowatts was used for lighting, the balance being consumed by railways, tramways, manufactories, mines, etc. Of these suppliers, the Tokyo Denki Kaisha is probably the largest amalgamation of hydro-electric schemes. Power is cheap, and at the Toi mines was supplied at a half-penny per kilowatt-hour.

Two well-known American electrical plant manufacturers have amalgamated with the more important Japanese concerns of a like nature, and are producing some excellent plant. In this branch of engineering the Japanese are certainly up-to-date.

The Japanese Miner

On the whole, the Japanese is a good miner, being industrious, intelligent, and loyal towards his employer. Physically, he is not as strong as the European or American miner, nor has he the same stamina. He requires much tact in handling, and responds far better to persuasion than coercion. By nature, the Japanese are very courteous and ceremonious to one another, and this is seen in the relations between officials and the men working under them. The writer found it very difficult, at first, to respond to the salutations of men underground and above surface, by raising his hat and bowing gracefully! But the Japanese is on an entirely different level from the Indian or Chinese miner, and to be successful in handling them one needs endless tact and patience. Having gained their respect and confidence, they will co-operate loyally with a foreigner in any work in hand. The family system of Japan theoretically extends from the Emperor, the Father of all Japanese, to the humblest peasant, and it is this inherent idea which engenders their loyalty. Each company is solicitous of its employees' welfare and exercises an almost paternal regard towards them. It is the custom in Japan for the employers to provide a uniform for their men which bears the trade-mark or crest of the donor on the back. These uniforms are given usually at least once a year. The miners of Toi receive coats (Hapi), which have on the back of them a design printed in white, consisting of crossed pick and hammer. The company's name is printed on the lapels of these garments. On the occasions of the two great annual festivals, a gift of money is usually distributed to each employee. When an employee severs his connection with his company, he receives a bonus, based on the length of service. Thus, a workman has some incentive to stay with his employer. Summary dismissal is unusual in Japan.

The miners, as a whole, earn good pay, and this has increased considerably during the last few years. The average pay for an underground miner is about 3s. 6d. a day, but, as in all contract work, this is often more.

In common with the Chinese miner, the Japanese work far better when on contract, and the writer found that the introduction of a sliding scale system of bonus worked well.

There is in the Japanese nature a curious combination of conservatism, which goes along with a keen desire to be "hai kara," that is, up to date, and it is sometimes extremely difficult to get him to adopt new ideas and methods. No one who has lived in Japan can fail to be struck with the hotch-potch of ancient traditions and modern innovations.

The writer had not previously seen jack-hammers used for driving and cross-cutting, and was somewhat pained to see three men employed on one small machine. This was supported on a telescopic pipe crutch, which was adjusted to suit the height at which the drill was boring. Photographs of American miners, using such a machine single handed were displayed in the windows of the shift-boss's office, and were duly admired by the miners. After a time, the number of men was reduced to two, and after considerable grumbling to one on each machine. Nevertheless some good driving was done in their own way, and the writer saw a cross-cut in andesite 8-ft. by 7-ft. advanced 285-ft. in one month. It may be added that this was done on the sliding scale bonus payment.

The Japanese miner considers it necessary to include in his equipment a seat woven of rice straw. This is attached by strings round his waist, and hangs down over his nether region. On pointing out to an old miner that this looked like an advertisement of his laziness while at work, the old man replied "All miners sit down, but why get rheumatism?"

Trades Unionism has become strong during the last few years, and the miners have a very powerful organization among themselves. About two years ago, a famous copper mine had serious labor troubles, and the men, led as usual by a few extremists, gave this company an anxious time. The police of Japan have a remarkably keen scent for labor agitators, and recently legislation has been passed making agitation and incitement to strike a capital offence.

The religious side of the Japanese is apparent in mining, and the setts at the entrance to many of the adits are horned and shaped in the form of the Torii, seen near all places of worship. On the Toi property, there is a shrine, dedicated to the "Mountain God," the special deity which presides over the fortune of these mines. Every year, on a special day, the miners and officials, dressed in their best clothes, repair to this shrine, and there, after offering up their prayers for the prosperity of the mine, partake of the national wine, saké, with the priest with the greatest solemnity.

EARTHQUAKES.—As is well known, Japan is very subject to seismic disturbances. The damage done to property in the affected areas is often enormous and the loss of life heavy. Yet, although after such disasters there may appear great cracks of considerable length, opened in the ground, no damage is sustained in the underground workings. The writer drew attention to this fact in an article in the "Mining and Scientific Press" in America, after the Great Earthquake of September 1, 1923. As a result of this catastrophe, Japan received a staggering blow, Yokohama, a city of 430,000 inhabitants being wiped out, Tokyo, the capital, suffering enormous damage, and the whole district being disorganized. The loss of life amounted to 130,000. The Toi mines lie some 50 miles from the epicentrum of this quake, and at the time, the writer was on

the opposite side of the valley to that on which the mine buildings are situated. The oscillations were incredible, and the brick smoke-stack of the mine, some 180-ft. in height, literally swayed about. It being a mine holiday, only a dozen men or so were at work at the time, concreting a pump chamber 150-ft. below sea level. Having been used for some years to the "rock-bursts" on the Kolar mines in India, and the damage done by them to stopes, shafts, etc., and knowing the large areas of ancient unfilled stopes in the Toi mines, the writer's belief was that considerable damage must surely have been done to the workings. On going across with the object of rescuing the concreting gang, these men were found busily at work, and absolutely unaware of the succession of shocks which had caused such appalling damage elsewhere. It was found that the loadings of the steam auxiliary plant had been seriously damaged, but underground no damage whatever had resulted. It would seem, therefore, that the seismic waves are confined to the surface, and do not travel at any depth.

CONCLUSION.—In dealing with the mineral resources and industry of an Empire within limits such as these, it is impossible to give more than a general survey. There are other aspects of Japanese mining and metallurgy which might be discussed with interest. Several of the leading mines and smelting works deserve fuller mention than has been made. Indeed, Messrs. Weigall and Thomson have shown, in their description of the Mitate tin mines, that a whole paper may be easily devoted to any one of them.

Marco Polo wrote "Cipango is a very great island. Its people are well favored and dependent on nobody. The gold they have is endless, for they find it in their own land." This may appear somewhat of an exaggeration, when judged by present day standards. Yet, as the writer hopes his article will have shown, Japan, for its size, is rich in minerals, which are now being exploited on modern lines. The Japanese in the immediate past have not hesitated to recognize and avail themselves of the accumulated experience of the West. With this knowledge, coupled with their own industrious and painstaking nature, it is reasonable to anticipate that her mineral industry will show even greater growth.

Telephones in the Philippine Islands

By Trade Commissioner George C. Howard, Manila

DESPITE the fact that the use of telephones in the Philippine Islands is a recent development, there has been considerable growth during the past five years not only in the number of instruments in use, but also in the line mileage, and present indications point to a further steady increase. At the end of 1926, at which date the most recent figures were compiled, there were 17,500 telephone instruments in use in the Philippine Islands compared with 13,354 at the end of December, 1922. Thus in five years there was a 31 per cent. growth in the number of instruments and a 25 per cent. increase in line mileage.

The city of Manila, the only place in which the use of telephones is fairly general, has approximately 73 per cent. of all the instruments installed in the islands. Although the gain in the use of telephones was principally accounted for within Manila, where total installations increased 2,387 as compared with 1,759 for the rest of the islands, the percentage of increase was higher in the Provinces—59 per cent. as compared with 23 per cent. for Manila.

There exists no long-distance telephone service in the Philippine Islands, with the exception of that on the island of Negros, where a line from Iloilo crosses to connect with some of the important sugar centrals. This line also is the only interisland line in operation. It is run between islands on the bureau of posts' telegraph cables and connects with the lines north and south of the town of Pulpandan, Occidental Negros.

There are 50 telephone companies in the islands, five are owned and operated privately and 45 by the governments of the Provinces in which they are located.

Few interprovincial connections are possible. Telephone services are principally confined to local service in the towns where

operated. In many instances the provincial telephone companies have few, if any, private subscribers, and confine their service to the various provincial government offices and officials located in the town.

The use of telephones in the Philippines is limited by the low-average earning power of the population, by the fact that the economic structure of the islands is preponderantly small-scale agriculture and household manufacturing, and, particularly in the case of long distance and interisland telephone service, by the fact that diversified dialects are spoken in the various parts of the country.

Notwithstanding these limitations, there is a growing demand for telephone service wherever it is available at a reasonable cost, and the number of installations are steadily increasing in commercial centers. The installation of the dial system in Manila has speeded up the service and should go a long way toward simplifying the language difficulty to be encountered in exchanges in the Provinces.

Long-distance service is now anticipated with the application of the Philippine Long Distance Telephone Co. for a 50-year franchise to build telephone lines and operate service between Manila and other important points. The first line constructed will be to Baguio, the important mountain city, according to present plans. This line is to be completed within a year after the granting of the franchise; lines to Legaspi are planned within three years, and those to Cebu, Negros, Aparri, and Zamboanga are expected to be finished within four years. This service, if established, will be a decided aid to business houses, a large number of which have head offices in Manila and branches or agents in the localities to be served.

Principal Features of the Sunglung Flood-Protection Project

THE object of the control-sluice is to make it possible to close the Sunglung creek, when the rise of the West River becomes dangerous to the Sunglung valley, and to maintain the discharge from the creek into the river, when the stage of the river so permits. Besides, the sluice will serve to retain water in the Sunglung creek over the dry season for irrigation purposes and for facilitation of traffic on the creek.

The sluice has been constructed on the eastern bank of the creek, where the ground offered the best foundation, at a distance from the creek of about 40 meters. The sluice consists of a 12.7 meters long and 7 meters wide chamber, which is extended by sidewalls 25.6 meters to the north and 14.2 meters to the south. The structure, which is made of concrete, rests partly on rock and partly on solid earth. Cut-off walls, one at each end of the chamber, are sunk into the rock, in places as deep as 7 meters below the elevation of the gatesill or 8.5 meters below the lowest waterlevel on record, while substantial side-walls, also of concrete, extend from the main-structure into the embankments. The sluice-chamber extends up to elevation +117.60, which is the level of the crest of the connecting dyke, *i.e.* 1 meter above the highest waterlevel on record. The free opening is 7 × 9.05 meters extending from elevation +102.50 to elevation +111.50. Above the same a breast-wall, likewise of concrete, is made across the chamber. The free opening has been calculated to serve navigation as well as drainage purposes. Thus the elevation of the sill permits a navigable depth at lowest low water of 1.5 m., while the opening is high enough to allow the passage of native craft during the normal low water season.

The gate is of the so-called "Stoney"-type, the principal features of which are: easy and reliable operation under all conditions, also against rapidly flowing water, and the requirement of small power for operation. This kind of gate is therefore especially suitable at a place in an outlying district, where only man-power is available and where the gate is to be operated under comparatively unskilled local supervision.

The gate has been designed to withstand the pressure of, and to be operated against, a head of 8 m. on the river-side [corresponding to a maximum waterlevel of 15 m. above the sill on the riverside and a simultaneous minimum waterlevel of 7 m. on the creek-side] and also against a head of 3 m. on the creek-side [corresponding to a minimum waterlevel of 1.5 m. above the sill on the riverside and a simultaneous maximum waterlevel of 4.5 m. on the creek-side].

The gate is made of steel-plates, supported by horizontal girders of steel-joists; the latter are framed to vertical steel end-beams. It is suspended at each end by means of two parts of steel wire ropes,

winding on to grooved cast-iron barrels carried on an operating bridge, and operated by help of a heavy counterbalance of reinforced concrete. This counterbalance is suspended at each end by means of four parts of steel wire ropes, two parts winding on to the above-mentioned cast-iron barrels and two parts passing to a "dead end," fixed to the operating bridge. The counterbalance thus travels only half of the way travelled by the gate, the purpose of this arrangement being to facilitate the balancing of the gate and to reduce the height of the superstructure.

The gate travels in grooves, formed in the concrete masonry, and bears, according to the "Stoney" principle, against frames of free rollers, interposed between the moving gate and the heavy iron castings, attached to the grooves. The roller frames are suspended in such a way, that they travel at half the speed of the gate, whether pressure is applied to the gate or not. Their function is to reduce the friction between the gate and the iron castings to a minimum, making it possible to move the gate by a power of only a few kilograms per ton of the horizontal load to which the gate is exposed. For protecting the rollers against the rush of water under the gate, when the latter is partly raised, shield-plates have been fixed to the groove members.

The operating gear, which is supported on a bridge as already mentioned, consists of a central crab, operating a cross-shaft, which by means of a pinion at each end drives the two rope barrels. The gearing is provided with spur reductions. The gate can be either lifted or lowered 9 meters in 1½ hours by two men, working at the handles, this speed of operation being quite sufficient in all cases.

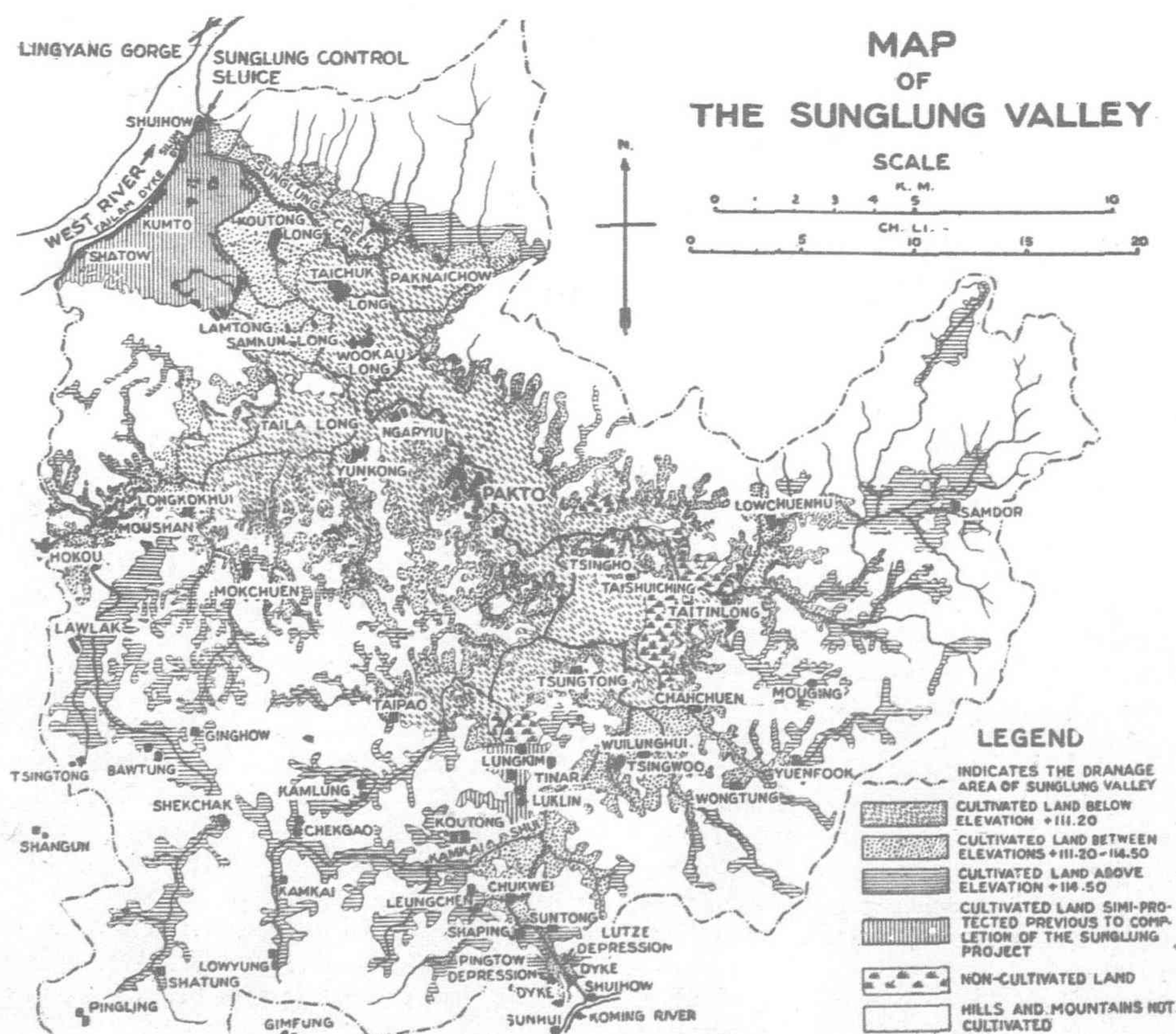
Special staunching arrangements have been provided for, where such are required.

The whole superstructure, consisting of the operating bridge with pillars, is of reinforced concrete. The elevation of the bridge is +124.60, *i.e.* 7 meters above the crest of the abutments.

Across the sluice-chamber, on the inner side of the gate and on the same elevation as the dyke-crest, a three meters wide traffic-bridge of concrete has been constructed. This bridge permits motor-cars to pass in case one of the roads, which are planned to be built in the near future, should cross the creek at this place. Besides, on the outer side of the gate, the upper edge of the breast-wall has been developed as a foot-bridge.

In view of further development of the Sunglung valley, the sluice may have to be used as a ship's-sluice. For this purpose provision has been made for the installation of lock-gates and for the extension of the chamber.

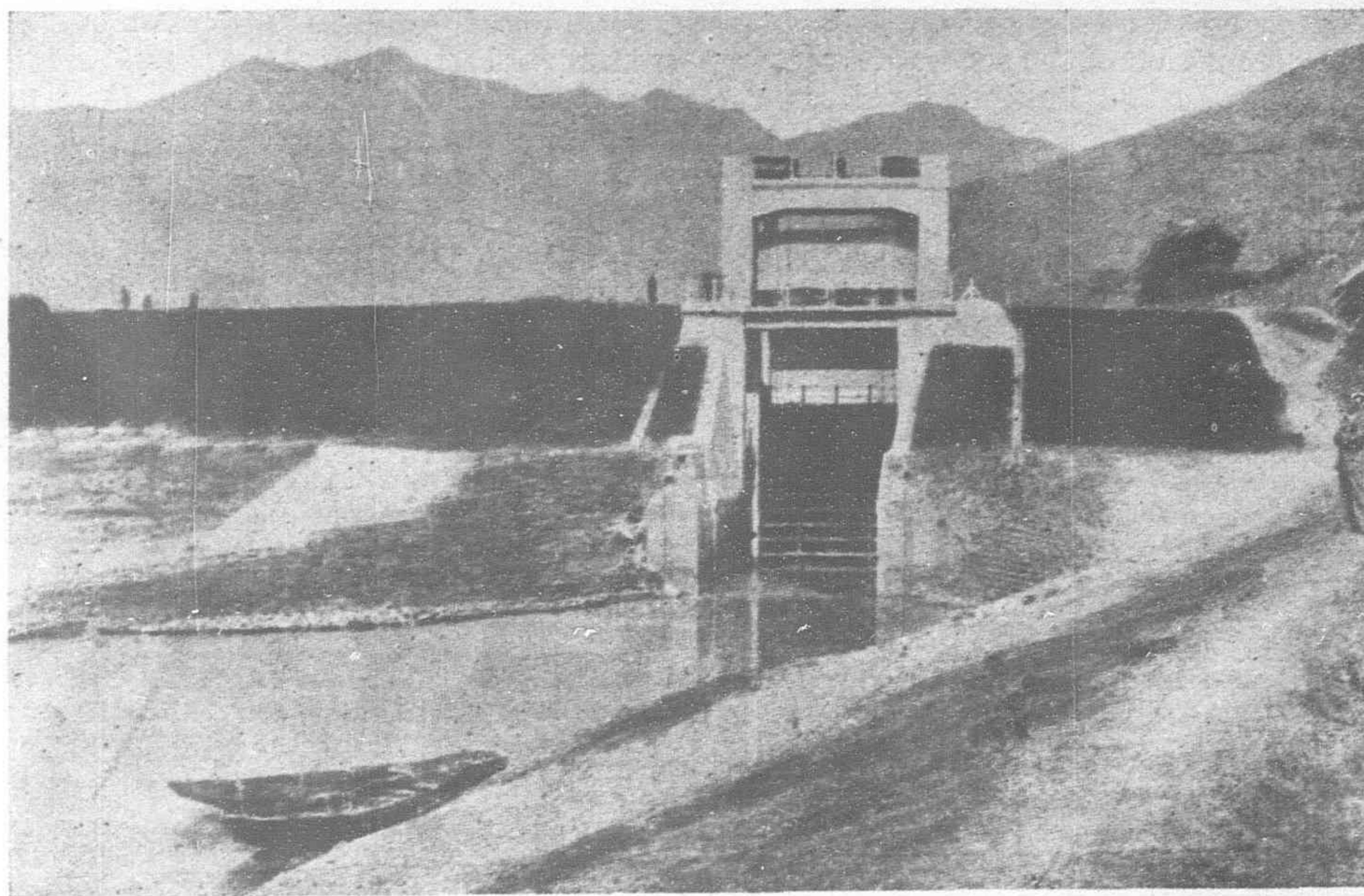
Right through the western abutment and wing-walls, a drainage pipe, one meter in diameter, has been built, fitted with an automatic gate of "Calco"-type on the outer side and a "Calco" slide-gate on



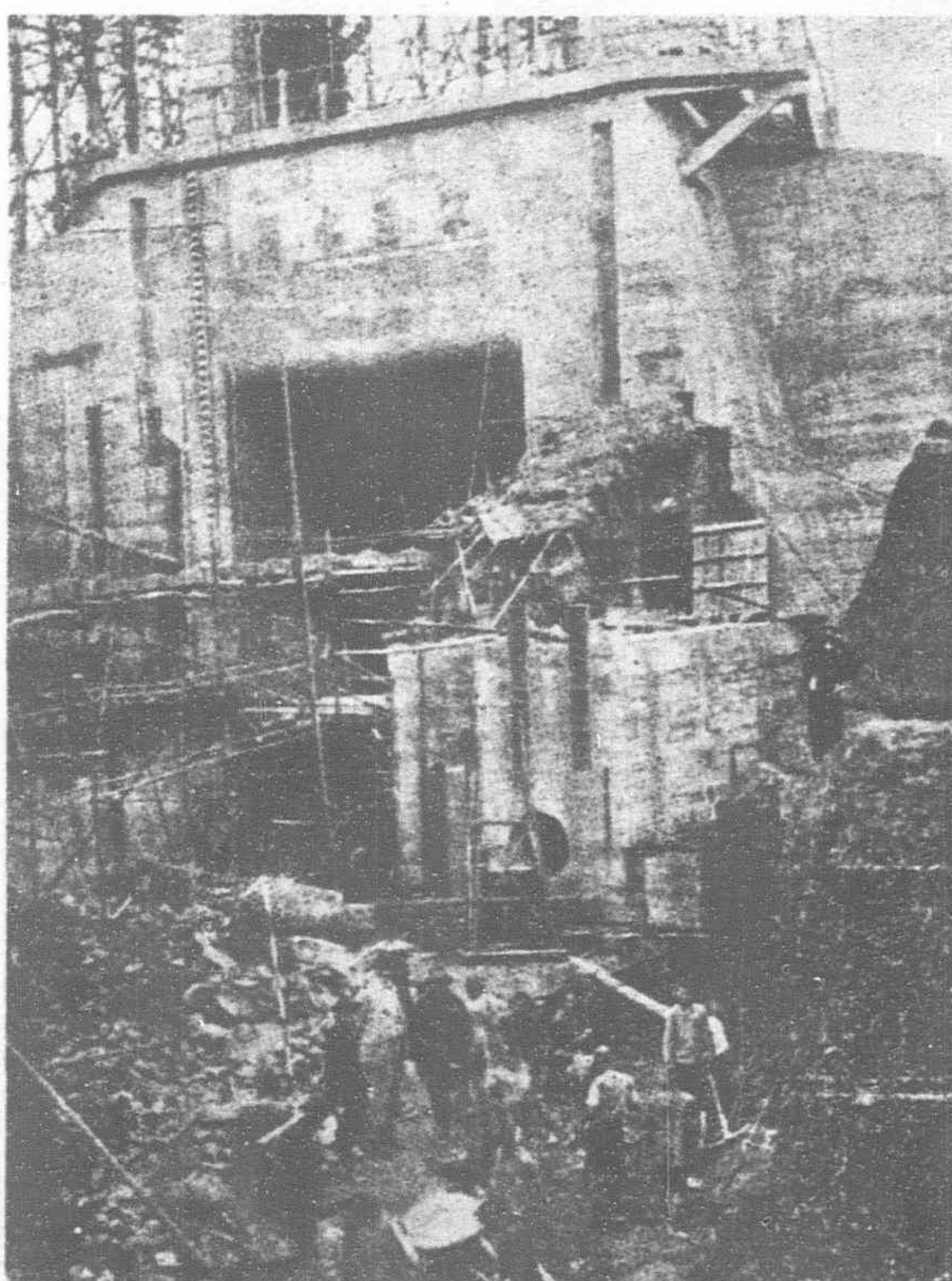
the inner side. This pipe has been installed for the purpose of leading off the flow in case of repair or extension of the chamber. In case of the sluice being developed as a ship's-sluice, it will, besides, be of use for emptying or feeding the lock-chamber.

As mentioned above the control-sluice has been constructed on the side of the original creek. It has therefore been necessary to excavate special outlet and inlet canals to the sluice, the bottom of which has been partly lined with stonepaving. Should the sluice later be used for boat-traffic the construction of stone revetment walls along part of the canals will be indispensable; but owing to the limitation of available funds, the construction of such walls has been postponed for the present. As a temporary arrangement rubble has been dumped along the eastern canal-bank for protection against scouring.

The excavation for the sluice turned out to be more comprehensive than originally expected. Borings had indicated the existence of rock on an elevation, somewhat higher than the elevation fixed for the sill, which was about 11 m. below the ground surface. However, it was found, that the bore had stopped against an old foundation structure, made of a kind of lime concrete, buried 8 m. deep, and resting on what appeared to be solid earth. The bed of lime concrete was 0.25 m. thick and rested on a platform of 12" timber, placed directly on the ground, which here consisted of hard clay. Evidently, a sluice or a kind of control work had once been in existence at this place, in order to check the flow into the Sunglung Valley, although the present generation had no knowledge of it. For one reason or another, this old control work seems to have been abandoned and covered with



Sunglung Control Sluice, Viewed from the Sunglung Creek



View of the Control Sluice Under Construction
Excavation for Sidewalls and Paving of the
Canal in Progress

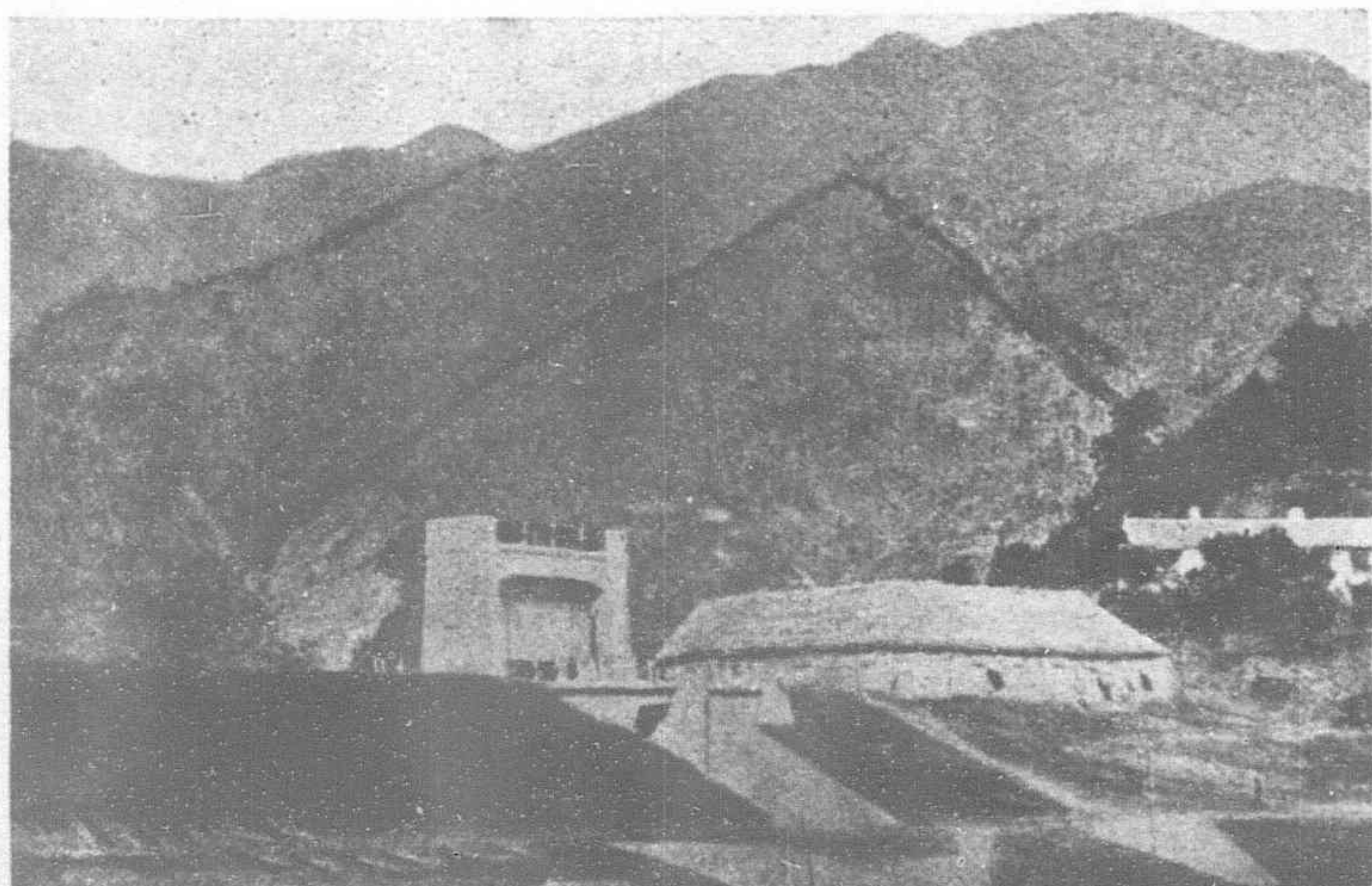
earth, whereupon a new water course, the present creek, was opened up. This interesting discovery leads to the conclusion, that previous generations had already realized the importance of regulating the floods in the Sunglung Valley. The old foundation had now to be removed and the excavation extended, until solid rock was reached. It was also necessary to extend the foundation for the cut-off walls as deep as 7 m. below the sill-level, or 18 m. below the original ground. In making the excavation, springs were frequently encountered. Continuous

pumping was, therefore, necessary to keep the pit dry. A combination of motor-pumps and native irrigation-pumps were employed for the purpose. At times the water had to be raised as high as 14 m.

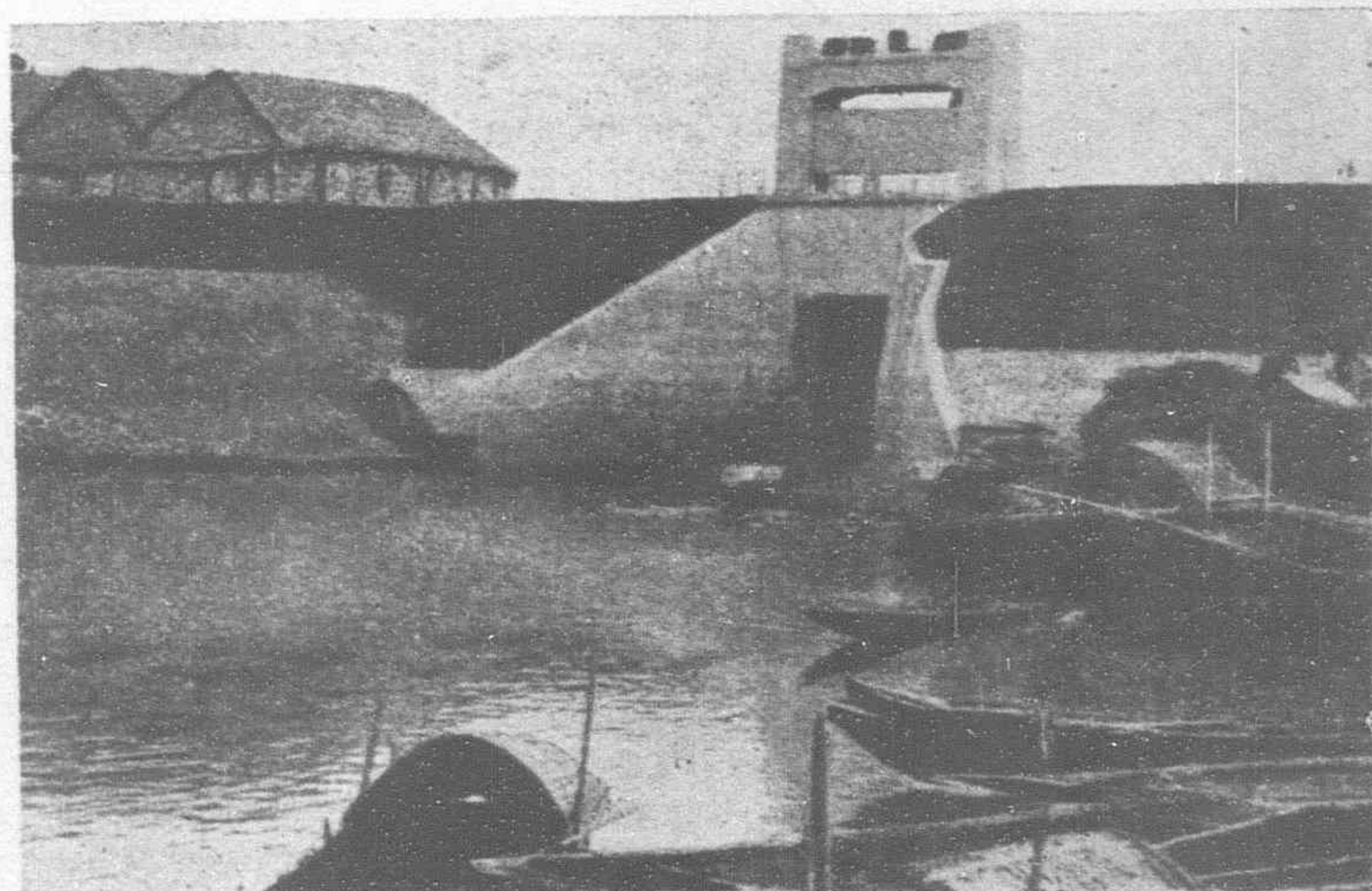
When excavation for the in-and outlet canals was proceeding continuous pumping was also necessary. The excavation caused much trouble on account of frequent slides taking place along the canal on the northern side of the sluice, where the substratum consists of bluish clay.

Concrete was at first produced by hand-mixing, the mixing platform being placed close to the forms. The gangs, which were employed for mixing, soon acquired remarkable skill and proved very effective. Later on a change to batch-mixers was made, and the concrete was conveyed from the stationary mixers by carts to the place of deposit.

For reinforced concrete was used granit and for other parts of the structure locally obtained sandstone. The stone used was carefully cleaned and for a time kept in specially arranged water tanks before being laid in. In some instances the sand was also cleaned by washing before being used.



Sunglung Control Sluice with Lan or Mountain in the Background



Sunglung Control Sluice. View from the West River

The installation of the groove-work and other built-in parts of the gate was made after the completion of the concrete structure, recesses being left for receiving bolts and imbedded parts. The erection of the gate proceeded without difficulty, and when tested it was found to operate to entire satisfaction.

The gate has been manufactured by Messrs. Ransomes & Rapier, Ltd., of London, who are well deserving of acknowledgment for an excellent piece of work.

The connecting dyke crosses the Sunglung creek and connects the old dyke-system along the West River with the hills on the eastern side of the creek. The dyke thus effects the final enclosing of the valley on the north. It has been constructed as an homogeneous earth embankment with the slope of 1 vertical to 3 horizontal on the river-side and of 1 to 2 on the land side. On an elevation, 6.5 m. below the crest, the landslope is broken by a 5 m. wide banquette. The slopes are protected by grassturf. In places exposed to the current, rip-rap has been used. The dyke has a maximum height of 19 m. above the creek-bed, and a maximum width at the base of 103 m. The connecting dyke as well as all other dykes have been raised 1 m. above the highest waterlevel on record, and the width of the crest has been made 3 m. The connecting dyke is 0.28 km. or 0.5 li long.

The Tailam and Silum Dykes

Tailam and Silum are in reality names for different sections of the dyke, which protects the Sunglung valley, where it opens towards the West River. Tailam is the name of the upstream part of the dyke, and Silum the name of the downstream part.

As already mentioned, the Tailam-Silum dyke was previously in a dilapidated state, and besides, was of insufficient height. The dyke had numerous bends, which gave rise to injurious eddies causing deep cavings into the dyke-body. The slopes were generally very steep and their protection was inadequate or entirely absent. On some stretches burrow-pits had also been dug right up to the toe of the old dyke, thus further weakening it. An almost entire reconstruction was therefore necessary.

As to the reconstruction great inconvenience was encountered owing to the fact, that generally a very limited space was available for the new dyke. For a considerable length, the dyke had to be constructed on an extremely narrow strip of land between the river and a number of villages, situated close by and partly on the dyke itself. The houseowners obstinately insisted upon their "right-of-way," which prerogative they were not willing to give up. Consequently, it was necessary to build extensive retaining walls, or to lay the slopes very steep and to protect them entirely with rip-rap. In some cases it was also necessary, at least as a temporary arrangement, to allow houses to remain partly within the dyke and to surround them with retaining walls. For financial reasons it has been necessary to postpone the straightening and further improvement of the river slope on a minor part of the dyke.

With the above-mentioned exceptions, it has generally been possible to avoid steeper side slopes than 1 vertical to 2 horizontal. In a few cases conditions have required a somewhat flatter slope on the waterside, namely 1 to 2.25 and 1 to 2.5.

In regard to slopes with grass facing, damage by vermin and mice always hampers the maintenance; but in the case of the Tailam-Silum dyke a far greater danger to the maintenance of good grass-slopes appears. Owing to the deplorable habit of the villagers to permit their cattle and poultry to roam about on the dyke, considerable damage is done. Unless regulations can be enforced, restraining this evil practice, and unless the natives are made to understand the importance thereof, it is of little benefit to spend money on the maintenance of a good grass-protection of the slopes. In order to bind the soil, and at the same time lessen the initial cost, the dyke slopes were covered with strips of grassturf only, in the expectation, that grass would then gradually grow between the strips. This method proved fairly satisfactory, although it will involve a continuous and expensive maintenance.

The retaining walls have been made of rubble masonry, laid in mortar of one cement and 2 lime to 6 sand, and with pointing in cement mortar. In some cases the walls have been built on a foundation, supported by piles. To a smaller extent, when conditions have permitted, the retaining walls on the land side have been laid in dry masonry with pointings in cement mortar.

The total length of the reconstructed Tailam-Silum dyke is 5.74 km. or 10 li.

In order to facilitate communication with the river a great number of crossings have been made in front of each village. People of different clans, even if they are close neighbors, generally refuse to make use of the same crossing. In consequence, the number of crossings have been made much greater than would otherwise have been necessary. The crossings consist of ordinary stone-steps. In some cases they have, for the convenience of the villagers, been sunk about three meters into the dyke, to be closed with stop logs when the stage of the river so requires. In such cases bridges of concrete have been built over the crossings to facilitate the traffic along the dyke.

On the western border of the valley there are six depressions in the water shed, one large one at Hokou and five small ones at other places, which naturally had to be closed by dykes. Through the Hokou depression passed a small brook, on which the villages on both sides of the depression were dependent for the supply of water for irrigation. In order to maintain prevailing conditions, after the dyke had been constructed, an irrigation-pipe has been substituted for the brook. This pipe, which is 0.75 meter in diameter, is of corrugated iron of the "Armco" type and fitted with an automatic "Calco" gate.

On the southern border dykes were required only across two depressions, called Lu Tze and Ping Tow, the choice of site for the dyke across the former one caused some difficulties, as the inhabitants of a small village, located at the outer end of the depression, wished to have the dyke constructed in front of their village in order to be protected against floods. In this case the dyke would cost considerably more, than if built further up in the depression. As the villagers were unable to contribute anything to meet the additional expenses, the cheaper site for the dyke was finally selected.

The dykes in the interior have all been constructed as homogeneous earth-embankments. The slopes have been laid in 1 vertical to 3 horizontal on the side exposed to the floods and in 1 to 2 on the other side. For the dykes on the western border a material was used, which became semi-fluid, when saturated with water. It was, therefore, necessary to apply an outer layer of good soil and to grassturf the entire slopes. For the other dykes grassturfing in strips proved sufficient.

Materials Used

Stone.—Although rocky hills appear frequently within the district, no good quarry could be found near the work, the stone available chiefly consisting of a soft sandstone of an inferior quality. Only at a place, 14 km. further up the river, a good solid sandstone was found. This place was also very conveniently located close by the river and was situated on Government land. It was, therefore, selected for the opening of a quarry. All preparations were completed, lodging-accommodations for the workmen had been arranged in a temple in the vicinity, and a force of 80 experienced quarry-men from Hongkong had been engaged and brought to the place, when objections were made by the opposers to the Sunglung project, who claimed the sole right to quarry at the selected place. Owing to political disorder in Canton at that time, it was impossible to obtain necessary support from the Government, and the Board had finally to abandon the place. Negotiations continued for some time with the view of getting the matter settled in a satisfactory way, but to no avail. It was then finally decided to open a quarry in the hill in the vicinity of the control-sluice, although this involved a considerable cost for removing earth and inferior surface stone. After the latter had been removed a fairly good sandstone was, however, found, which could be used not only retaining walls along the dykes but also for abutments and sidewalls at the sluice. A double-track light railway was constructed from the quarry to the working-place. The quarrying commenced in the autumn of 1924.

For retaining walls along the dykes, stone was also obtained from local contractors.

The granite-stone, used in the sluice, was brought from a quarry, situated on the Canton-Kowloon railway, by rail to Canton and then further to Sunglung by junks.

Sand.—A good, coarse and comparatively clean sand was obtained from sandbars in the West River at the mouth of Sunhing Kong, about 8 km. from the sluice, and a sand of still better quality from the river-bed of Sunhing Kong.

Water.—River water could not be used for concrete-mixing without filtering. Such a procedure was, however, avoided by

the discovery of a well right back of one of the abutments of the sluice, where a rich flow of ground-water appeared. The natural rock formed the bottom of the well, and, after a shaft had been built through the abutment, the well proved to be most useful and was never lacking water.

Cement.—Cement of sufficiently good quality could not be obtained locally. It was therefore necessary to import all cement. In 1924-25 cement of Danish and thereafter of Haiphong manufacture was used.

Reinforcement Steel.—All reinforcement, consisting of corrugated bars in sizes up to 1," was of American manufacture and obtained through local firms.

Timber.—With the exception of a small quantity of sown Oregon pine, imported from North America, all timber required for scaffoldings, formwork, piling etc., was obtained from local timber-dealers.

Other materials.—These were obtained from Canton, when available, otherwise from Hongkong or Shanghai.

Costs

The total expenditures for the works, including further improvements of the dykes up to September 30, 1928, amount to H.K. \$620,484.65,* made up as shown below. Of this amount the Sunglung Reclamation Association has been debited \$380,424.90, of which \$310,557.26 had been paid in to the Board up to December 1, 1928.

<i>Control-sluice with inlet and outlet canals, connecting dyke and dykes in the interior of the valley.</i>			
Preparatory work, including surveying, mapping, drawing, etc.	H.K. \$	4,572.05	
Concrete structure for sluice, including wing walls and excavation for foundation and abutments . . .		132,142.38	
Iron gate with accessories, including erection ...		29,664.84	
Inlet and outlet canals to sluice, excavation and stone protection of sole and slopes		36,344.94	
Connecting dyke		37,191.96	
Dykes in the interior of the valley		44,094.96	
Transportation of material, cost of which cannot be distributed on the separate items		6,152.61	
Expenditures for opening of quarry (removing of earth and inferior surface stone, transport-way from quarry)	H.K. \$	10,061.02	
Expenditures for damage, owing to floods, etc., and for arrangements to prevent such damage		5,378.06	
Demolition of houses, removing of graves, etc... ..		3,058.17	
Compensation to house-and landowners		50.27	
Store and store yards		8,331.84	
Workshops		2,145.49	
Housing of working-force, expenditures for their employment and dismissal, policing		9,307.43	
Permanent buildings used for office and staff-quarters		8,094.58	
Supervision and administration, including travelling expenses and maintenance of quarters for staff, office, etc.		47,183.42	383,774.02
<i>Silum dyke</i>			
Preparatory work, including surveying, mapping, etc.	H.K. \$	1,889.09	
Earthfill, including clearing of ground, cut-off ditches, etc.		49,374.84	
Retaining walls		9,622.88	
Protection of slopes		3,195.45	
Crossings over the dyke		1,258.04	
Demolition of houses, removing of graves, compensation to house-and landowners		1,565.71	
Expenditures for damage, owing to floods, etc., and arrangements to prevent such damage		74.46	
Miscellaneous expenses		81.44	
Transportation of materials, cost of which cannot be distributed on the separate items		493.27	
Store, workshops, housing and employment of working-force, policing... ..		1,572.37	
Supervision and administration, including travelling-expenses and temporary quarters for staff, cost of office, etc.		11,338.32	80,465.87
<i>Tailam dyke</i>			
Preparatory work, including surveying, mapping, drawing, etc., ...	H.K. \$	2,120.34	
Earthfill, including clearing of ground, cut-off ditches, etc.		63,506.79	
Retaining walls		27,841.76	

Protection of slopes		6,085.90	
Crossings over the dyke		2,281.62	
Demolition of houses, removing of graves, compensation to house-and landowners		260.30	
Expenditures for damage, owing to floods, etc. and for arrangements to prevent such damage		830.75	
Miscellaneous expenses		1,104.69	
Transportation of materials, cost of which cannot be distributed on the separate items		521.18	
Store, workshops, housing and employment of working-force, policing... ..		2,128.24	
Supervision and administration, including travelling-expenses and temporary quarters for staff, cost of office, etc.		15,072.52	121,754.36

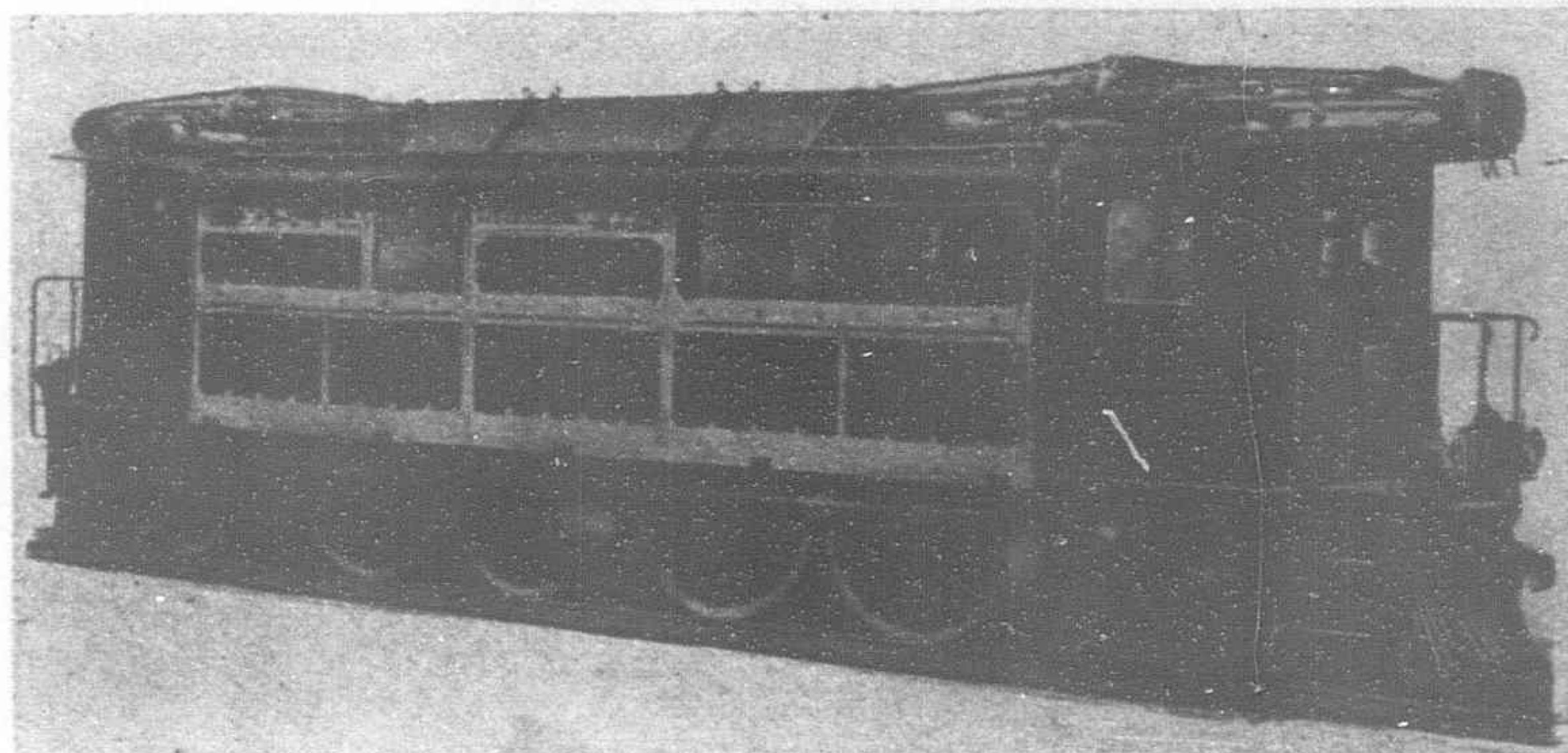
King Fook dyke

Preparatory work, including surveying, mapping, drawing, etc.	H.K. \$	1,908.11	
Earthfill, including clearing of ground, cut-off ditches, etc., ...		10,940.18	
Retaining walls		11,509.42	
Protection of slopes		1,923.33	
Crossings over the dyke		106.18	
Demolition of houses, removing of graves, compensation to house-and landowners		9.45	
Expenditures for damage, owing to floods, etc. and for arrangements to prevent such damage		579.44	
Miscellaneous expenses		11.98	
Transportation of materials, cost of which cannot be distributed on the separate items		20.61	
Store, workshops, housing and employment of working-force, policing... ..		493.60	
Supervision and administration, including travelling-expenses and temporary quarters for staff, cost of office, etc.		6,988.10	34,490.40
TOTAL	H.K. \$	620,484.65	

*All cost-figures have been given in Hongkong currency on account of the large and frequent variations of the local currency during the time of construction. The exchange has varied between \$1.16 and \$1.32, Canton subsidiary coins, to one Hongkong dollar, but has most of the time been \$1.30.

Brown Boveri Express Locomotives for Java

Last year Brown, Boveri & Co. received a repeat order from the Dutch East Indies State Railways for two 1 D₀ 1 express locomotives with Brown Boveri individual axle drive. The new machines (series Nos. 3003 and 3004), are similar to those supplied in 1925, merely the system of electrical braking and a few minor details having been altered. They were shipped at Rotterdam for Batavia at the end of March and April of this year, and in July were put into service on the Batavia-Buitenzorg Line.



Express Locomotive for the Dutch East Indies State Railways
Non-driving side; side-panels of Locomotive Removed

In a report concerning the preparation of these new locomotives for service, sent to Brown, Boveri & Co. from India on June 9, 1928, the following statement was made:

"As soon as the new locomotives are running, the old Brown Boveri machines, Nos. 3001 and 3002, will be overhauled. These have been kept in service uninterruptedly for three years without any revision."

The Electrical Industry of Japan

Electric Light in Use

IT was forty-two years ago, or in November, 1887, that the electric light was introduced to Tokyo City. The electricity business in this country has since so swiftly developed that at the end of 1927 there were in use as many as 2,288,000 electric lights in Tokyo City alone and 32,322,991 lights throughout the whole country. The total lights in use in the whole country represent 605 million candle lights and over 736 k.w. They work out at 0.53 light per capita, or about $2\frac{1}{2}$ lights per house. For more than 30 per cent. of these lights, charges are calculated according to the amount of electricity consumed. For the rest they are fixed so much per light.

Increase in the Use of Electric Power

The supply of electric lights has become so widespread that they are in use even in out of the way districts, and in big cities they have all but ousted gas lights. No less development is shown by the supply of electric power for industrial use, domestic use and for the use of railways. At the end of 1927 there were 339,737 electric motors in operation throughout the whole country, developing 2,404,569 h.p. The demand for electric power supplied by other forms of equipments was 446,366 k.w. As may be seen from the list appended, the consumption of electric power developed by motors increased 133 per cent. in ten years and that developed by other forms of equipments 148.

The growth of the electrification of industry is tabulated below:

DEMAND FOR ELECTRIC POWER.

Year	Electric Motors		Other Equipments (in K. W.)
	Number	H. P.	
1918...	104,084	1,031,652	179,953
1919...	119,383	1,130,263	170,793
1920...	144,418	1,282,042	209,869
1921...	174,070	1,552,332	213,194
1922...	192,017	1,661,147	221,722
1923...	204,954	1,726,737	232,604
1924...	243,756	1,823,235	274,367
1925...	261,592	2,087,008	303,983
1926...	298,956	2,292,690	341,981
1927...	339,737	1,404,569	446,366

As may be seen from the table below, foods and drinks come first with the increase in the use of motors with 254 per cent. in ten years, followed by mining and refining with 173 per cent.

ELECTRIC MOTORS BY USES (at the end of 1927).

Line of Industry	Number	Increase of		Percentage
		H. P.	over 1918	
Dyeing ...	54,600	339,000	170,000	100%
Machine ...	44,000	393,500	121,200	45
Chemicals ...	26,600	383,900	179,400	88
Foods and drinks ...	115,700	311,100	223,200	254
Mining and Refining ...	11,500	540,400	342,400	173
Others unclassified ...	87,300	436,700	336,700	337
Total ...	339,700	2,404,600	1,372,900	133

In the ten years under review the electric railways made such rapid development that the mileage covered by passenger cars increased by 108 per cent. Particulars follow:

Year	Extension of Mileage	Car Mileage	Number of Passengers
1918 ...	947	120,162,000	981,572,000
1922 ...	1,239	154,565,000	1,406,085,000
1927 ...	2,414	249,159,000	1,988,433,000

Capital Increased Quintupled

The paid-up capital of the companies concerned, which stood at Y.646,514,000 at the end of 1916, had risen to Y.2,677,153,000 by the end of 1927. It will thus be seen that during the decade under review it increased 314 per cent. Taking into account debentures and borrowings, the aggregate capital of the electrical companies at the end of 1927 ran into Y.4,100,000,000. Contrasted with Y.779,901,000 ten years ago, it shows an increase of Y.436 per cent. This rate of increase of capital is ahead of that of the increase of the supply of electric power. The generation of

electric power by water and heating power was 983,966 k.w. at the end of 1918. At the end of 1927, or ten years after it stood at 3,467,131 k.w., having increased by 252 per cent. during the ten year-period. Thus the increase in the generation of electric power and that of capital stood in a ratio of 6 to 10. Had it not been for the fact that, as stated above, debenture issue and borrowings occupy a large part of the capital, the position of the concerns would be seriously strained. Below is given a list showing the proportion of profit to the paid-up capital.

Year	Nominal Capital	Paid-up Capital	Fixed Capital	Debentures and borrowings
1918 ...	788,506,000	646,514,000	737,688,000	133,387,000
1922 ...	2,124,047,000	1,507,949,000	1,686,493,000	415,325,000
1927 ...	3,524,199,000	2,677,153,000	3,667,387,000	1,506,040,000

Year	Paid-up Capital	Profit	Proportion of Profit to Paid-up Capital
1918 ...	646,514,000	73,571,000	11%
1919 ...	762,124,000	88,161,000	11
1920 ...	949,409,000	118,177,000	12
1921 ...	1,200,068,000	149,760,000	12
1922 ...	1,507,949,000	188,295,000	12
1923 ...	1,703,195,000	192,212,000	11
1924 ...	2,012,205,000	217,249,000	11
1925 ...	2,218,649,000	252,977,000	11
1926 ...	2,453,588,000	279,331,000	12
1927 ...	2,677,153,000	279,541,000	10.5

Ample Possibilities of Development

The total capacity of the hydro-electric power of the country is put at 11,933,000 h.p. on an average. Helped by heating power, it will more than meet requirements for thirty years to come. The development of the generation of electric power for the past thirty years is appended:

Year	GENERATING CAPACITY		Total	Rate of Increase of Generating Power		
	Completed	Remaining to be completed		Water Power	Heating Power	Total
1918	Completed	...	597,124	386,842	983,966	17
	Remaining to be completed	...	589,011	248,957	837,968	6
	Total	...	1,186,135	635,799	1,821,934	12
1919	Completed	...	710,929	422,314	1,133,243	19
	Remaining to be completed	...	799,748	249,550	1,049,298	9
	Total	...	1,510,677	671,864	2,182,541	15
1920	Completed	...	825,387	552,159	1,377,546	16
	Remaining to be completed	...	1,000,104	190,233	1,190,337	31
	Total	...	1,825,491	742,392	2,567,883	22
1921	Completed	...	914,744	611,974	1,526,718	11
	Remaining to be completed	...	1,068,036	174,983	1,243,019	11
	Total	...	1,982,780	786,957	2,769,737	11
1922	Completed	...	1,070,960	709,113	1,779,173	17
	Remaining to be completed	...	1,064,971	214,465	1,279,436	16
	Total	...	2,135,031	923,578	3,058,609	16
1923	Completed	...	1,307,706	755,079	2,062,785	22
	Remaining to be completed	...	850,021	199,195	1,049,216	6
	Total	...	2,157,727	954,274	3,112,001	16
1924	Completed	...	1,474,357	763,146	2,237,503	13
	Remaining to be completed	...	1,021,963	250,332	1,272,295	1
	Total	...	2,496,320	1,013,478	3,509,798	9
1925	Completed	...	1,813,508	954,633	2,768,141	23
	Remaining to be completed	...	1,076,526	397,937	1,474,463	25
	Total	...	2,890,034	1,352,570	4,242,604	24
1926	Completed	...	1,965,970	1,236,644	3,202,614	8
	Remaining to be completed	...	1,426,611	222,438	1,649,049	30
	Total	...	3,392,581	1,459,082	4,851,663	16
1927	Completed	...	2,111,087	1,356,044	3,467,131	7.5
	Remaining to be completed	...	1,764,334	152,825	1,917,159	10
	Total	...	3,875,421	1,508,869	5,384,290	8.5

Aeronautical Progress in China

PUBLIC interest in aviation evinced recently in China has justified the observation that in transportation China may skip the water and land stages of communication and enter directly into the aerial stage. This trend is supported by recent rapid progress made in aeronautics.

The planning of various air routes, the around-China flights by two aviators, the construction of aerodromes at important centers, and the completion of "Made-in-China" airplanes bear testimony to the rapid development of commercial aviation in this country.

While the history of aviation and balloon flights goes back many years, China's aeronautical record barely exceeds two decades. It is interesting to review the brief history of flying in China and to note its many vicissitudes, how it was handicapped and discouraged in the past, and how it again came to be inspired by public interest. Thirty years ago the airship was unknown to China, the only air craft to which China claimed a knowledge being the balloon. In 1908, the first year during the short reign of Emperor Hsuan Tung, a Frenchman brought a plane to Shanghai and staged several exhibition flights. In the course of his last flight the plane crashed and the flier was killed. The incident struck fear into those present and a general doubt regarding the safety of flying was entertained.

The following year the Imperial Court realizing the importance of modern scientific innovations, issued an edict for the development of flying. At that time experienced fliers were unknown in China, so repeated efforts of the Government to secure experts were to no avail. The third year of Hsuan Tung, 1910, witnessed the incipient stage of aeronautics in China, for during this year a Chinese student named Li Ru-yien who had been sent by the Government to study aviation returned from America. In company with two French fliers he started an aeroplane factory at Nanyuan, Peiping. Shortly after the factory was in operation the Chinese Revolution of 1911 broke out and all schemes for advancing aeronautics were given up. The factory at Nanyuan was deserted and the material and machines in use there were lost.

It was the late Dr. Sun Yat-sen who first conceived the idea of attacking the mandarins with airplanes during the revolution. About 50 planes were ordered from abroad for war purposes but they did not arrive until as late as the third year of the Chinese Republic (1914) long after the first revolution was over. As the only use of airships in those days was for throwing bombs and maneuvering over enemy's camp the Government did not make use of the planes and stored them in Canton.

Two years later, in 1916 when the Republican Government was settled in Peiping an aviation school was established on the site of the old airplane factory at Nanyuan. Returned students who specialized in aviation and foreign technical experts arrived from abroad and contributed a great deal to the success of the school. The Government then began to take an active interest in aviation and appropriated a substantial sum of money for the purpose. The aviation school was changed into the Government Aviation Bureau attached to the Ministry of Interior and the Ministry of Communications. A tupan was appointed for the Bureau and some progress was made.

During the Fengtien-Anhui war in the years that followed aeroplanes were for the first time brought into play for fighting purposes in China. After the war was over the central authorities in Peiping, seeing the usefulness of airplanes for commercial purposes, formally inaugurated an air mail service from Peiping to Shanghai. But owing to the lack of funds, lack of expert Chinese pilots and lack of public support, the plan also failed to materialize.

After the European War of 1914 came to end General Chang Hsueh-liang, son of the late Mukden Warlord introduced aeroplanes into the Fengtien army. Aeroplanes played a significant rôle in the European War and the ambitious warlord in Manchuria was led to believe that a fleet of planes would greatly strengthen his military prowess in China. General Chang Hsueh-liang was subsequently appointed chief of the Aviation Department. He engaged many foreign fliers as instructors and technical experts in the army and not less than 200 planes were bought in Europe. The result of the work, however, was expected the chief reason being that the planes were mostly used ones discarded by the

Powers after the Great War. Many planes became unfit for use in a very short time. However, a group of student cadets were trained who participated in the subsequent wars between Fengtien and Chihli. An aerodrome was also established at Mukden attached to the Fengtien army headquarters.

In Canton aviation progress commenced with an aviation school and a factory for repair work at Da Sha Tou. In 1924 the school was intended to train cadets for army maneuvers and in 1926 the school was properly staffed and the factory well equipped with modern machines. About seven or eight French and German aviators were employed at the school, who, when the Northern Expedition was started in the summer of 1926, actually participated in warfare at the front. As the student cadets at the times were still inexperienced Russian fliers were admitted into the army. The Chinese students were ambitious and learned rapidly the art of piloting a plane and of maneuvering in the air until they were sufficiently experienced to displace their Russian colleagues.

During the fighting in and about Wuhan, Chinese fliers took a prominent part in the aerial warfare. The Russians, who were paid to fight for an alien cause, were not courageous although they were possibly better pilots. Many Russians were displaced by student cadets at that time. After the split of the Wuhan and the Nanking Governments when the radical elements and Borodin's associates were entirely eliminated, all the Russian fliers were asked to leave, and from that time on no foreign fliers have been employed by the National Government.

The student cadets kept on practising flying after the war was ended. A factory for repairing and manufacturing planes was established at Nanhui, Wuchang. After the removal of the Government, General Chiang Kai-shek ordered the removal of the factory and the immediate departure of the students from Wuhan. The student cadets who received the telegram got away from Wuchang but the planes were detained by the Wuhan military.

On arriving in Nanking the student cadets found several Cauldron planes left by Marshal Sun Chuan-fang. An aviation bureau was formed, attached to the central military headquarters. The planes were later used in the war along the Shanghai-Nanking line against Sun Chuan-fang.

At the battle of Luntang, one of the greatest battles fought since the Northern Expedition started, two pilots, Chang Wei and Shih Ma-nyui were highly praised for their work in defence of the new Capital. One plane maneuvered at Pukow and one at Luntang. In the war against Chang Chung-chang in 1927 aeroplanes were used to a great extent along the Tientsin-Pukow railway. Chang Tsung-chang was in possession of many new planes piloted by Japanese and Russian fliers while the Nationalists had only old planes and Chinese pilots. Between Pengpu and Hsuehchowfu, where the headquarters of the two belligerent units were stationed, the fighting was most severe. A story is told of one Nationalist plane which descended into the enemy's camp in Hsuehchowfu and safely took off again after a thorough investigation into the aerodrome. Seaplanes were used in the expedition against Tang Shen-chi.

The foregoing is a brief history of Chinese aviation in the army. Commercial aviation began after the expeditionary wars and is now closely associated with the National Reconstruction program in China. At present, there are altogether some 200 planes in China, mostly imported.

Sponsored by the Government, flying enthusiasts are engaging in the manufacture of planes in China. Already seven Chinese-made aircraft have made their appearance. There are three plane factories in China, one in Shanghai, one in Canton and another at Pagoda Anchorage in Fukien. The airplane factory in Shanghai is situated at Hungjao on the western outskirts of Shanghai. The Shanghai and Canton airplane factories are for manufacturing planes for military purposes and the one in Fukien is for making naval seaplanes.

The parts, the wings and the body of the plane are all made in China with native materials, the motor being imported because China does not produce the necessary mixed metal, which is strong and light, required in making the framework of the machine. It is said that Japan is also manufacturing her own planes with imported motor.

The Hungjao Aerodrome has already completed a plane named "Cheng Kung No. 1." A trial flight recently proved most successful. Another plane is now in the course of construction and will be completed shortly at the same aerodrome. The airplane factory in Canton has manufactured two planes and the factory at the Pagoda Anchorage, Fukien, has produced three.

The "Cheng Kung No. 1" is the result of the efforts of Mr. Sun Te-shih and Mr. Chow Chia-mu, who were appointed director and technical expert, respectively, of the aerodrome and the factory by the National Government. The factory was started six months ago, in August, 1928, when four mechanics, 31 supervisors and more than 120 workers were employed.

The plane was built after the Cauldron type of planes and accommodates two persons in the front and rear cockpits, one for the pilot and one for the passenger. The wings each measure 20 feet in length. It carries a Bristol 220 h.p. motor. With the exception of the engine all parts of the plane were made in China at a cost of only \$3,000. The engine cost \$4,000 and the workers' wages amounted to \$1,000, the plane thus costing approximately \$8,000. The plane is capable of attaining a speed of 70 miles an hour and an altitude of 15,000 feet. In addition to two persons it can carry 1,000 pounds of mail.

Mr. Sun Te-shih, director of the factory, is a graduate of an American Aviation College and of the Peking Aviation School and the Chefoo Naval College. Following his graduation in America he went to England and obtained his practical experience in the Vickers factory and later in the Rolls-Royce factory. He has served as president of the Peking Aviation School and as commander of the Nationalist Air Force, and at present besides acting as director of the factory and aerodrome he is chief of the Aviation Department of the Ministry of War.

Closely associated with the Hungjao aerodrome is the National Aeronautical Association of China at 438 Rue Lafayette which is in touch with aeronautical activities in all parts of the country. The man in charge of the Association is Mr. Ling Nyoh shen. The Association prints several publications on aviation.

The recent around-China flight made by Generals Chang Hwei-chang and Chow Chia-heng who have been referred to in the foreign press as China's Lindbergh, are further proofs of the rapid development of Chinese aviation. General Chang Hwei-chang is chief of the Aviation Bureau attached to the 8th Route Army Headquarters. He flew in a Ryan monoplane from Canton to Mukden and back, stopping at Hankow, Nanking, Peking, Tientsin and Shanghai. No mishap befell him during his successful tour, which served to promote aviation among the masses more than printed matter and propaganda lectures. The Ryan plane was fittingly named the "Spirit of Canton," indicating the city from which General Chang flew.

General Chow Chia-heng, assistant of General Chang, followed suit, flying also in a Ryan plane, called the "Spirit of Chu-kiang," to Foochow, Ningpo, Shanghai and Nanking. His attempt to fly to Tientsin and further north, however, was frustrated because of weather conditions. The Ryan plane in which he flew was a seaplane, and as the rivers in North China were all frozen at the time, he could not be sure of suitable landing places. He got as far as Hankow in Central China and then returned to Canton.

The air mail service which is now being widely discussed and planned by the Government and private enterprises has an equally interesting history. The first aeronautical association in China, called in Chinese was formed in Canton before the Northern Punitive Expedition was started. When the Nationalist armies reached Wuhan in the spring of 1927 another association was organized along the same lines as the one in Canton, the latter being dissolved with the evacuation of the fliers from the city. When the Government was removed from Wuhan to Nanking, the Wuhan Aeronautical Association was deserted and a new association was established in Nanking. Shortly after this the association in Canton was revived and was named the "Committee for Aeronautical Defence." In Honan the Northwest Aeronautical Association, was organized. The association at Nanking, Canton and Kaifeng (Honan) all have as their object the promotion of passenger lines and mail services.

In July, 1928, a conference was called in the Capital for aviation interests in China. As a result of the meeting the three aeronautical associations were amalgamated and became known as the Chinese Aeronautical Association. The new organization came into being on August 1 last year.

Five main mail lines have been considered by the Chinese Aeronautical Association. They are: (1) the Shanghai-Hankow Line, (2) the Canton-Shanghai Line, (3) the Canton-Hankow-Szechuen Line, (4) the Peiping-Hankow Line and (5) the Peiping-Shanghai Line. The first three lines have been planned and decided upon and actual work will soon be started. The 4th and the 5th lines have been proposed but complete plans have not been outlined. It is said by aeronautical authorities that within half a year the first three lines will be in operation and that if the mail service is successful a passenger service will immediately be operated.

The lines mentioned above are main lines. They will have various branch lines extending to all important cities. Stations along the various routes as well as the length and location of the branch lines will be decided on later. It is estimated that at least \$200,000 is required as initial capital for the operation of the first three lines.

The foregoing schemes are those formulated by the Chinese Aeronautical Association. Other schemes for short distance air lines as well as some long distance lines also are being made by provincial authorities and private individuals. It is understood that the air mail and passenger services will not be converted into Government corporations or quasi-public owned corporations like the Government Railways and the Postal Service, in which the Government has investments and direct interests and exercises supervisory control. They will be purely commercial enterprises for interested capitalists and flying enthusiasts. The Government, however, for the purpose of sponsoring these undertakings, has formulated various schemes for rendering assistance to private parties.

The scheme formulated by the Ministry of Communications recently has four divisions. The various proposed air routes will be laid out with the Capital as the center.

It has been announced that preparations for the inauguration of an inter-provincial air mail service for Kwangtung and Kwangsi are nearing completion. Four main lines will be operated first connecting Canton with various important cities of the Provinces. The entire distance to be covered will be 1,550 miles. Stations for the Eastern Line will be established at Weichow, Swabue, Hsingning and Hoping; for the Western Line at Shiuhing, Wuchow, Kweihsien and Nanning; for the Southern Line, at Kongmoon, Yangkiang, Shuitung, Haihow, Luchow and Penhai; and the Northern Line, at Yingteh, Shiuhing and Nanhung.

A direct Canton-Nanchang line will be started following the installation of the Kwangtung-Kwangsi routes. In a communication to General Chu Pei-teh, Chairman of the Kiangsi Provincial Government, Commander Chang Hwei-chang of the Canton Aviation Department requests that aviation fields be established at Nanchang and Kiukiang so as to complete the Northern Line.

In the first air-mail flight between Canton and Nanning in Kwangsi, Mr. Chow Chia-heng in his seaplane "Spirit of Chukiang," carried several bags of mail, which were delivered according to schedule time. On the return flight three passengers, Mrs. Feng Tso-wan, wife of the Provincial Commissioner of Finance for Kwangtung, Mrs. Liao Peh-fong, and Mr. Sheng Pan-fei, were taken to Canton. This incident also reveals that Chinese women are taking a keen interest in aviation.

In North China similar plans for developing aviation are under way. In Tientsin a semi-official company capitalized at \$4,000,000 will be organized for air lines to Mukden, Shanghai and Hankow with Tientsin as the center. In Peiping the North China Commercial Aviation Association is being organized under the auspices of the Peiping Division of the Central Political Council. The object of the association is to develop air transportation in the various provinces and districts in the North. A school of aviation for the training of fliers and a factory for the manufacture of aeroplanes will also be opened. A sum of \$300,000 has been pledged by the provincial and municipal authorities for the purchase of six aeroplanes.

Preparations for the inauguration of a Shanghai-Hankow commercial air service under the auspices of the National Aeronautical Association are progressing smoothly and it is expected that as soon as aeroplanes are ready for use the service will be started immediately. Of the authorized capital of one million dollars, \$300,000 has already been collected. It is proposed first to operate a daily passenger and freight service between Shanghai and Hankow with stops at various important cities in between.

(Continued on page 271).

A 20,000 kw. Turbo-Alternator for the Japanese Imperial Government Railways

THE turbo-alternator shown on test in the manufacturer's

Works in Fig. 1 is a machine of 20,000 kw. rating, which was ordered from Messrs. Mitsui & Co., Ltd. for the new Power Station of the Imperial Government Railways, Japan. This turbo-alternator is of the latest design to meet special over-load requirements, and was manufactured at the Rugby Works of the British Thomson-Houston Co., Ltd., which is the British Factory of the General Electric Company of America.

Fig. 2 shows in some detail the turbine with the top half casings removed, the steam rotors being in position in the bottom half casings. The turbine is of the two-cylinder type with 25 stages, and is designed for steam conditions of 25 kg. per sq. cm., 375 degrees C temperature, the vacuum at 25 per cent. over-load being 722 mm. with the barometer at 760 mm. The speed of the set is 1,500 r.p.m., and the normal rated output, 20,000 kw., 6,600 volts, three-phase, 50 cycles, at 90 per cent. power factor.

The machine was shipped from Liverpool per *s.s. Keemun* of the Blue Funnel line (Messrs. Alfred Holt & Co., Ltd., Birkenhead), and for transport from Rugby to the Docks upwards of 20 railway wagons—including several specially constructed vehicles—and 10 Scammell Road Vehicles were brought into use, the total weight shipped approximating 400 tons.

The London, Midland & Scottish Railway Company arranged a special running schedule for their train, as

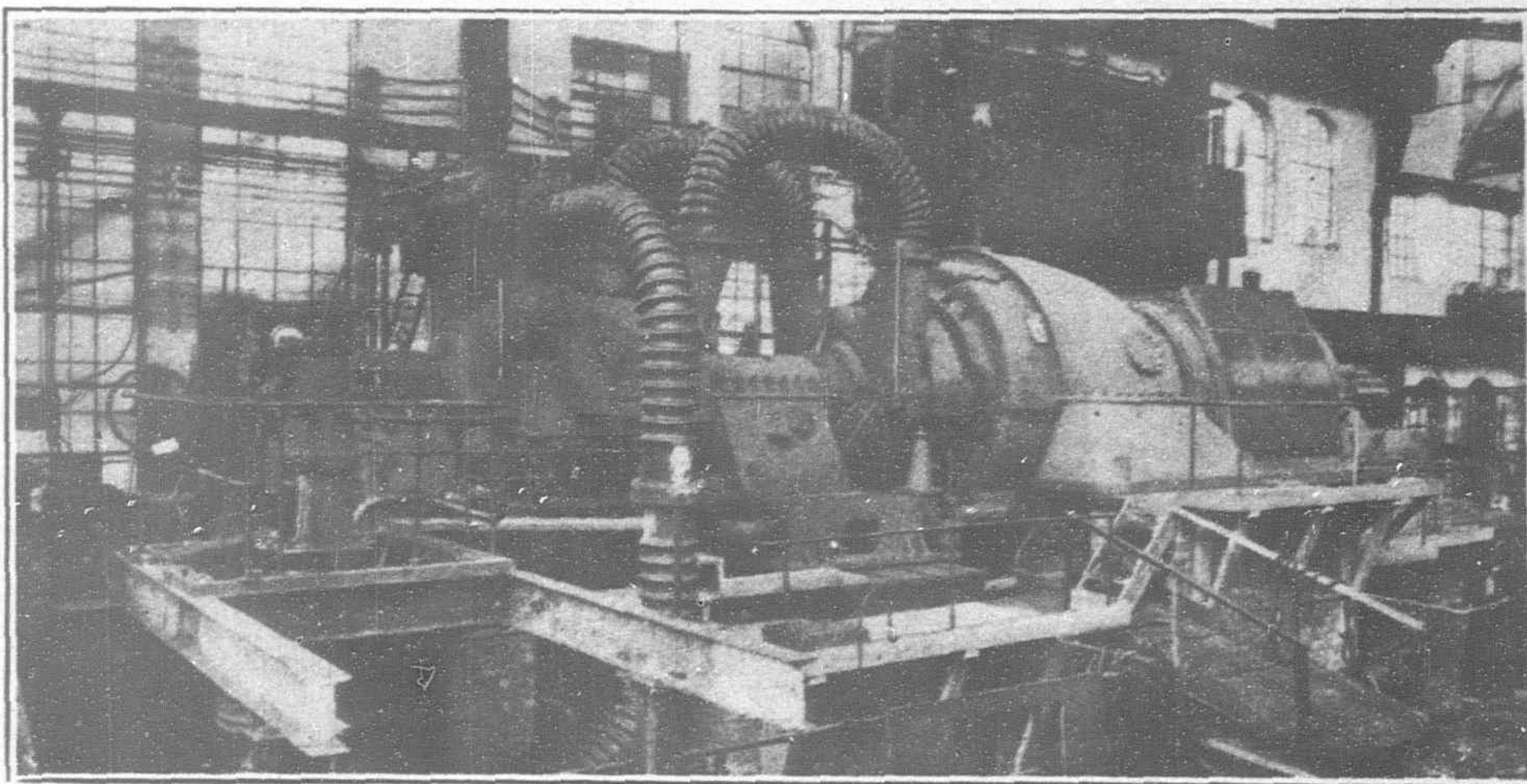


Fig. 1.—Turbo-Alternator Being Tested at Rugby Works of British Thomson-Houston Co., Ltd

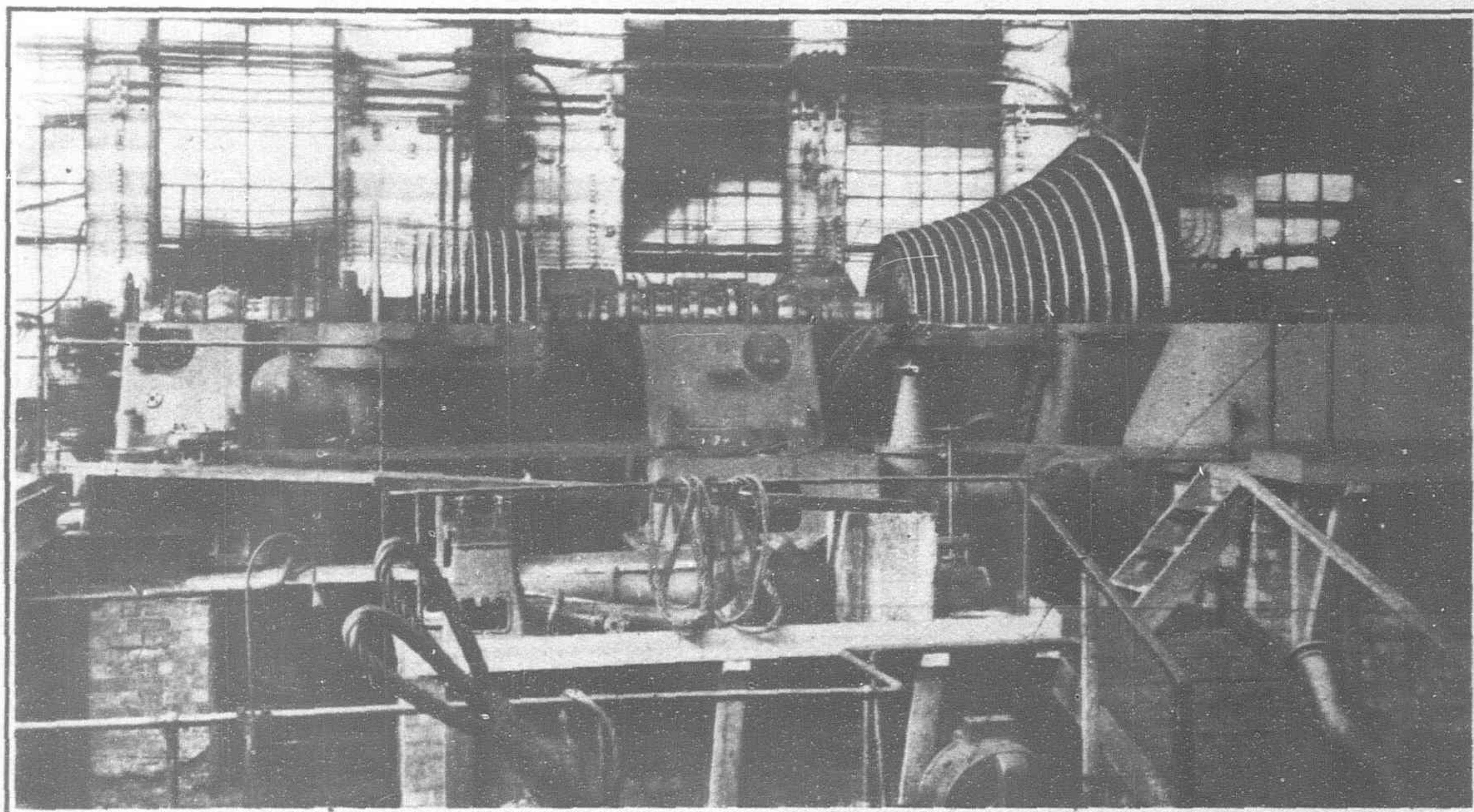


Fig. 2.—Top Half Casing Removed

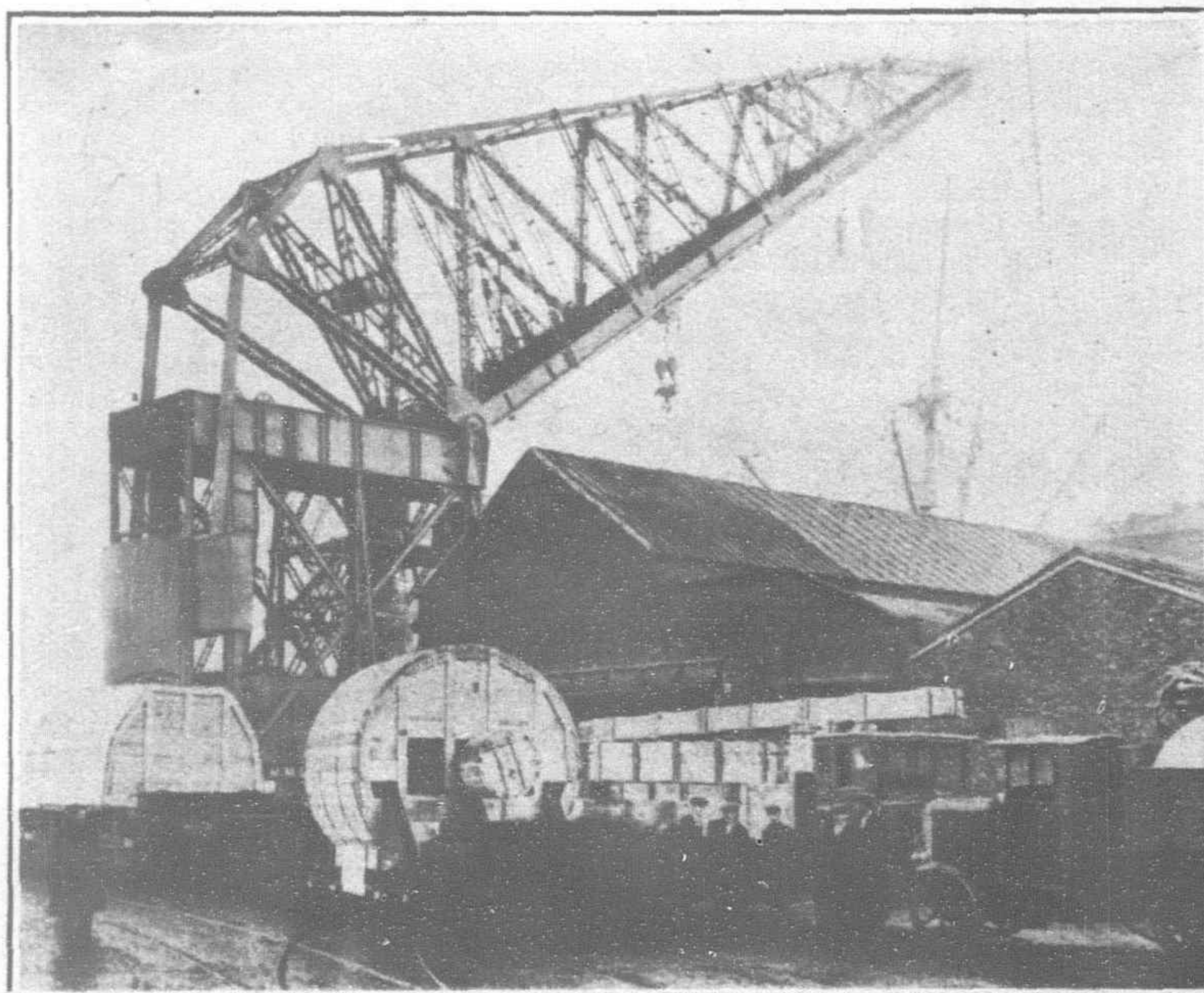


Fig. 3.—Moving the Turbo-Alternator from Shop to Ship

several pieces were considerably over-gauge, and it is interesting to note that only five days elapsed between the first despatch from Rugby and the stowage on board *s.s. Keemun* of the various pieces making the complete machine.

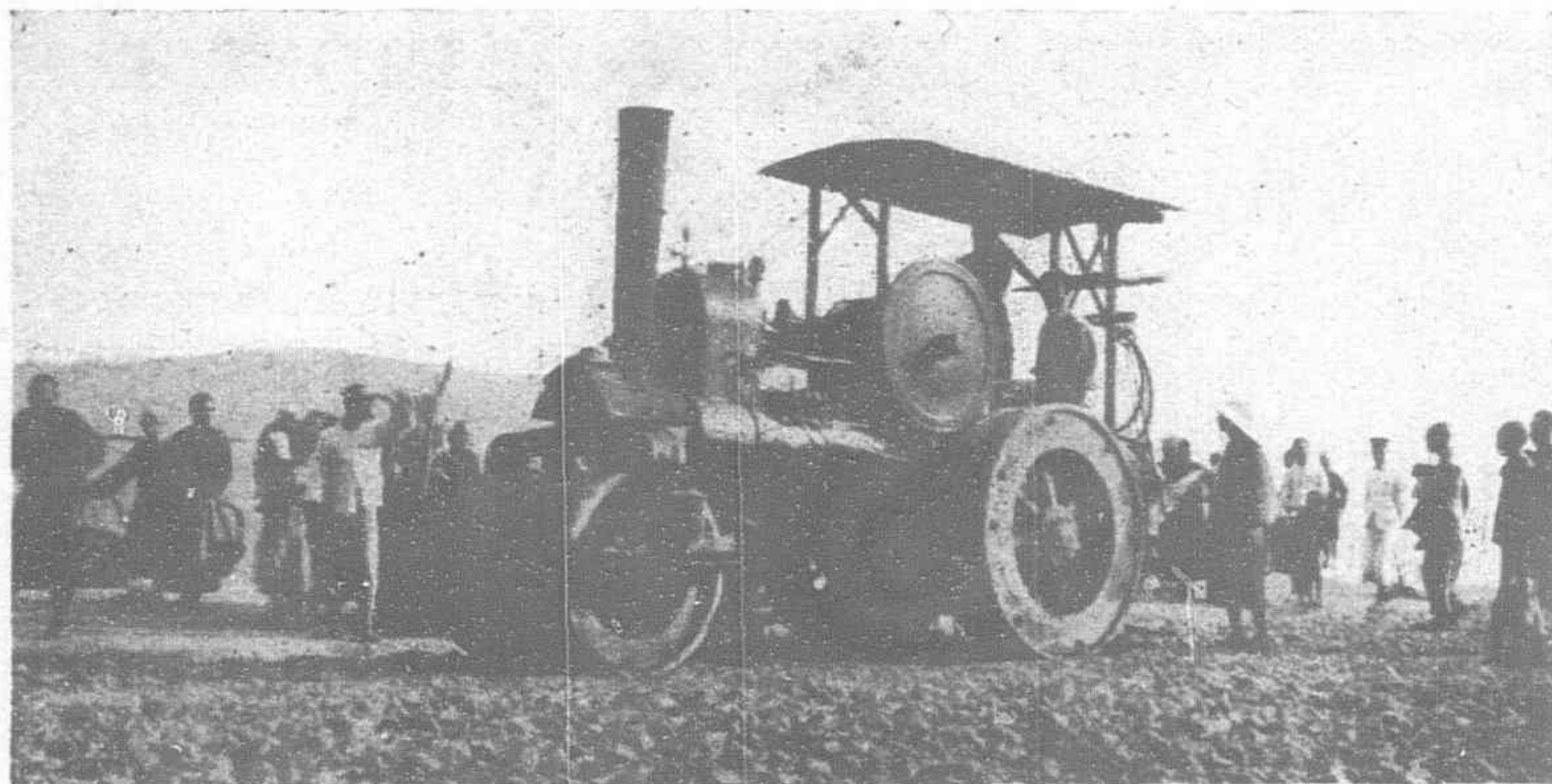
Various views of the consignments at Liverpool Docks are given in the accompanying illustrations, two of the most interesting loads shown in Fig. 3 being the low pressure steam rotor and the electrical stator, as they arrived by rail. The weight of the low pressure steam rotor (in the foreground), circular boarded and with skids ready for shipment was 17 tons, 7 cwt. 1 qr. and the dimensions 192 inches by 126 inches by 128 inches, the railway gauge being thus exceeded by nine inches on either side. The electrical stator weighed 50 tons, 7 cwt. and measured 169 inches by 125 inches by 119 inches, and was, therefore, 8½ inches over gauge on either side.

Aeronautical Progress in China

(Continued from page 270).

In Central China, a commercial passenger and freight air service between Hankow and Changsha is being inaugurated. The Hankow Aeronautical Association is giving a number of demonstration flights. Tickets are being sold at \$18 for a first class passage and \$10 for second class passages.

The aerodrome in Hankow was completed on February 17 and a test flight of all the aeroplanes to be used in the commercial service took place on February 20.



Modern Machinery on a Szechuen Road

Szechuen's New Roads

By John Marshall

POSSIBLY by the end of this year, but more likely during the early part of next year, a highway connecting two of Szechuen's most important cities will be publicly opened. The one city is the river port of Chungking; the other is Chengtu, the capital of the Province.

To the student and to the merchant, to the farmer and to the general, this development of inter-communication bears an attitude of importance. It is recognized that China, a country of many problems, would have fewer internal troubles if only intercourse between one section and another, between one province and another, was made less difficult. Linking these sections and provinces by a network of stretching highways would assist greatly.

For several years those political leaders in Szechuen who have been advocating a modernization along Western lines have been promoting the thought that public highroads should be laid throughout that Province. It was their plan to first connect the Tibetan frontier with Chengtu and to connect Chengtu with Chungking.

Two years ago work was under way. To-day, finds the first stretch from Tibet to Chengtu advancing noticeably and the stretch from Chengtu to Chungking, except for sixty to eighty miles, about completed. The distance between these two cities by the new highway is approximately three hundred miles, a distance that can be covered in one day's time. To-day, nine to ten days must be given over to the journey which is made by sedan-chair.

An interesting problem was born when the engineers were planning just how and where to bring the great highway into Chungking. That city is built on a hilly and narrow tongue of land that lies between the Yangtzekiang and the Little River. It is a city of steps, incline walks, and more steps. In its expansion, it could only move in one direction—westward, and there, covering acres and acres was an enormous cemetery dating back centuries.

The municipal council, after much debating as to the results of such procedure, issued an ultimatum declaring that all those having relatives buried in the cemetery should remove them to a new cemetery-site that had been selected. Notices were sent



The Szechuen Main Highway

out and from one to three months grace was given. At the end of that time all the graves that had not been opened were opened and the remains removed to a spot on a nearby hill and there interred, a pagoda being then erected to mark the place.

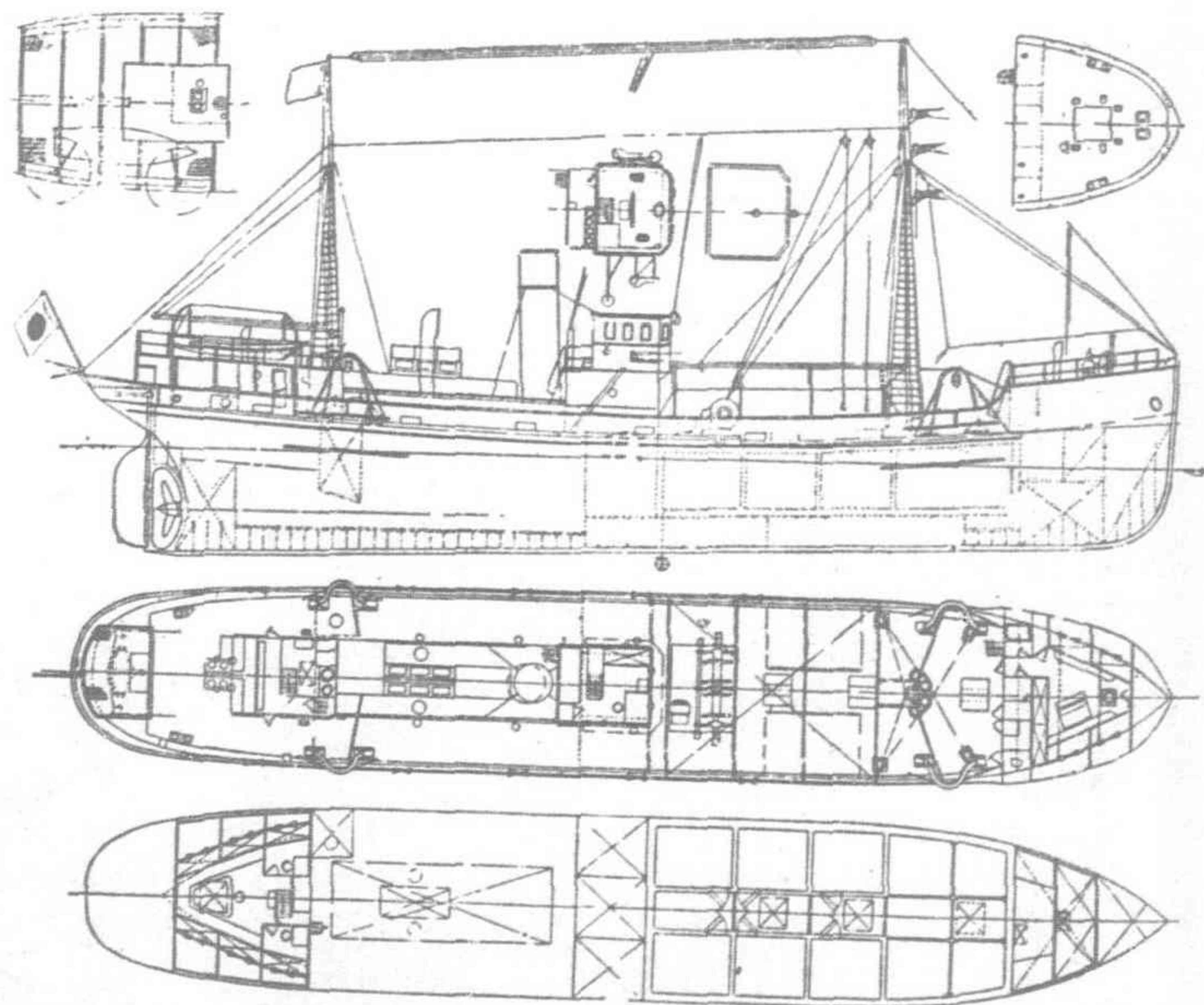
The one time cemetery with its hundreds of excavations resembling so many pox-marks was sub-divided and sold. A main road through this territory was laid out, the cost of construction being met by money derived through the sale of land. This main artery to Chungking's new suburb is nearly completed and as it winds its way over and around the hills in graceful fashion the visitor is again reminded of the beauty of the surrounding landscape.

The general pattern of this municipal roadway is that of a great horseshoe, with its ends adjoining Chungking. It was decided that the highway from Chengtu should cross this road and twist its way over several small hills, entering Chungking at a point on the Little River side. Both of these roadways are surfaced with from twelve to eighteen inches of crushed rock and clay which have been packed to almost the hardness and smoothness of concrete by steam-rolling. The roads are well graded and have drains of hand cut stone gutters. Trees have been planted every fifteen feet and come up through square spaces left when the stone slab foot-paths were laid. The whole has been excellently planned.

It was thought that the Chengtu-Chungking Highway when opened would be a tempting stretch for armed bandits. Every precaution will be taken, for intermittently troops will be stationed along the entire route.

A Japanese-built Motor Trawler

THE first motor trawler constructed in Japan is the "Kushiro Maru," of which plans are published, and which has been in commission for some time. She was built at the Nagasaki works of the Mitsubishi Zosen Kaisha, and is 135 ft. long, with a beam of 24 ft. and a depth of 13 ft. 6 ins., the gross tonnage being 312. She is owned by the Kyodo Gyogyo K.K., her home port being Shimonoseki. The "Kushiro Maru" is rigged as a two-masted fore-and-aft schooner, and is constructed of steel with decks of teak and oregon pine. Fresh water is carried in both peak tanks



The Trawler "Kushiro Maru," the First of Its Type in Japan

and forward of the vessel, whilst fish holds and ice stores are laid out for a considerable portion of the length. A motor-driven CO₂ refrigerating plant and brine-cooling chambers are provided, and the trawling winch is electrically driven, an electric windlass being fitted. The machinery is also of Japanese construction. A two-stroke single-acting Diesel engine built at the Niigata Iron Works, Yokohama, is installed in the engine-room. It has six cylinders, 13½ ins. bore with a piston stroke of 19½ ins., and develops 750 b.h.p. The normal service speed of the vessel is 11½ knots.

Bean Milling in Manchuria

BEAN milling industry was founded in China a few hundred years ago. In Manchuria, hemp oil mills used to be practically all that existed till about 60 years ago. About Tiehling and Changchun which then made important Bean markets, the process of expressing oil from hempseed was applied to Beans with flattering results, and this opened bean milling industry in Manchuria.

Those engaged in the new enterprise rapidly increased in Manchuria, and the demand for bean oil keeping rising, hempseed oil found its uses gradually reduced, and in time, the name of an oil mill came to refer to a bean oil factory. At that time, the object of the mills lay chiefly in obtaining Bean Oil, and Bean Cake being regarded as only a by-product good only for cattle feed. Still the scope of demand was of practically local character, and the milling process was conducted very often by hand or by means of a donkey. In short, the whole affair was a primitive and a small-scaled thing.

The Sino-Japanese War, 1894-1895, marked the opening of export of Bean Cake to Japan. As its fertilizing value became recognized, its demand expanded all at once, inflating the annual export to Japan.

The mills in Manchuria, from this epoch-making time, their reversed estimation of Bean Oil and Cake, giving precedence to Bean Cake over Bean Oil.

In recent years, since, from the universal shortage of oil and fat stocks all over the world, Manchurian Bean Oil came to be run after in all parts of the world, its exports to the West has been quickened. It reached the zenith of its popularity during the Great War as everybody knows. Thus Bean Cake has its principal market in Japan and South China as an important manure, while Bean Oil has made itself a favourite on the American and European markets as a food and an industrial raw material. And this is how the bean milling industry in Manchuria has acquired its present importance and activity.

Oil Milling Processes

The prevailing oil milling processes in Manchuria may be divided into the following kinds:

- (1) Manufacture of round Bean Cake by expressing.
- (2) Manufacture of plate Bean Cake by expressing.
- (3) Benzine extraction.

We might further sub-classify the expressing and extracting processes as under:

EXPRESSING PROCESS

(With the sole exception of Honen Bean Mill, Dairen, in all Manchuria).

BY PROCESS OF OPERATION

- (a) Old or native mills.
Using draught animals or worked by hand.
- (b) By new or mechanical process.
Chiefly operated by mechanical and motive power.

BY KINDS OF EXPRESSING DEVICES—WEDGE PATTERN

The wedge pattern for expressing purposes is what was in vogue before Beans and products rose to be world-wide merchandise and their demand was still confined within the borders of China. It formed part of the small-scaled and most primitive milling scheme, and is still maintained by minor mills in the interior.

SCREW PATTERN

Use by the Taikuyuan Mill, Yingkou, in 1896, was the first of this pattern to be used.

By this pattern the expressing process depends also on manual labor, but, compared with the wedge pattern, labor and time and also space may be economized, rendering it fit for a large-scaled production. Many mills using mechanical appliances still maintain this pattern, and the majority of mills along the S.M.R. Lines belong to this class.

HYDRAULIC PRESSURE SYSTEM

(a) Round Bean Cake.—

Round Bean Cake is put out as in the case of the wedge and the screw pattern. It is an improvement on the screw pattern and has been recruiting a larger number of clientele. In fact, a greater number of Dairen mills are run on this system.

(b) Plate Bean Cake.—Part of the Nisshin Oil Mills, Dairen, is turning out plate Bean Cake. The Kabalkin Mill, Harbin, is the only other plant in Manchuria that has adopted the new process that is considered as the advanced.

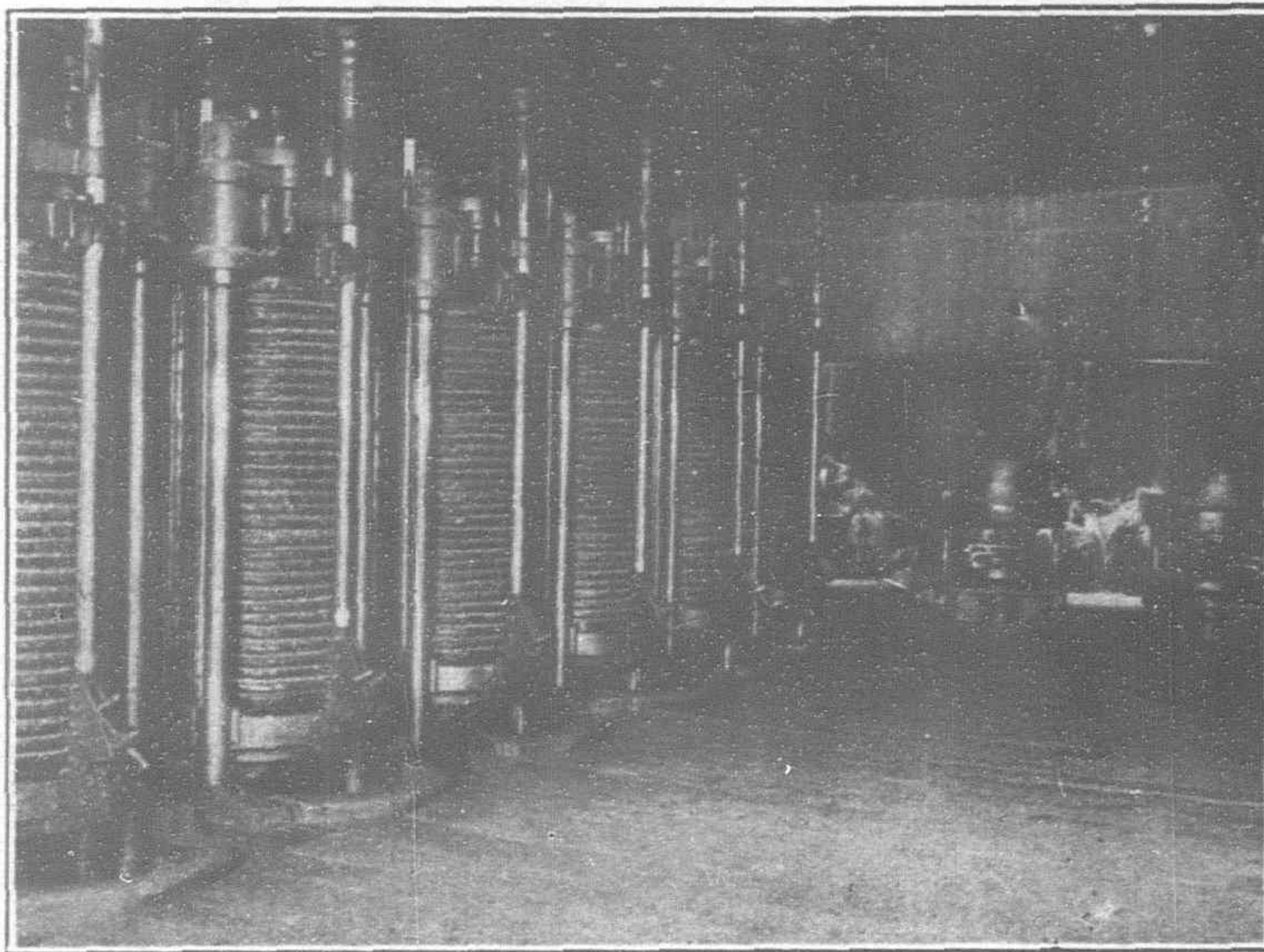
BY CHEMICAL EXTRACTION

The oil contents of Beans are extracted by means of a chemical solvent and is the most up-to-date process. For solvent, benzine is the most popular, benzol coming after it. In Manchuria the Honen Bean Mill, Dairen, is the only factory operated on this system. However, in Japan proper the system is predominant.

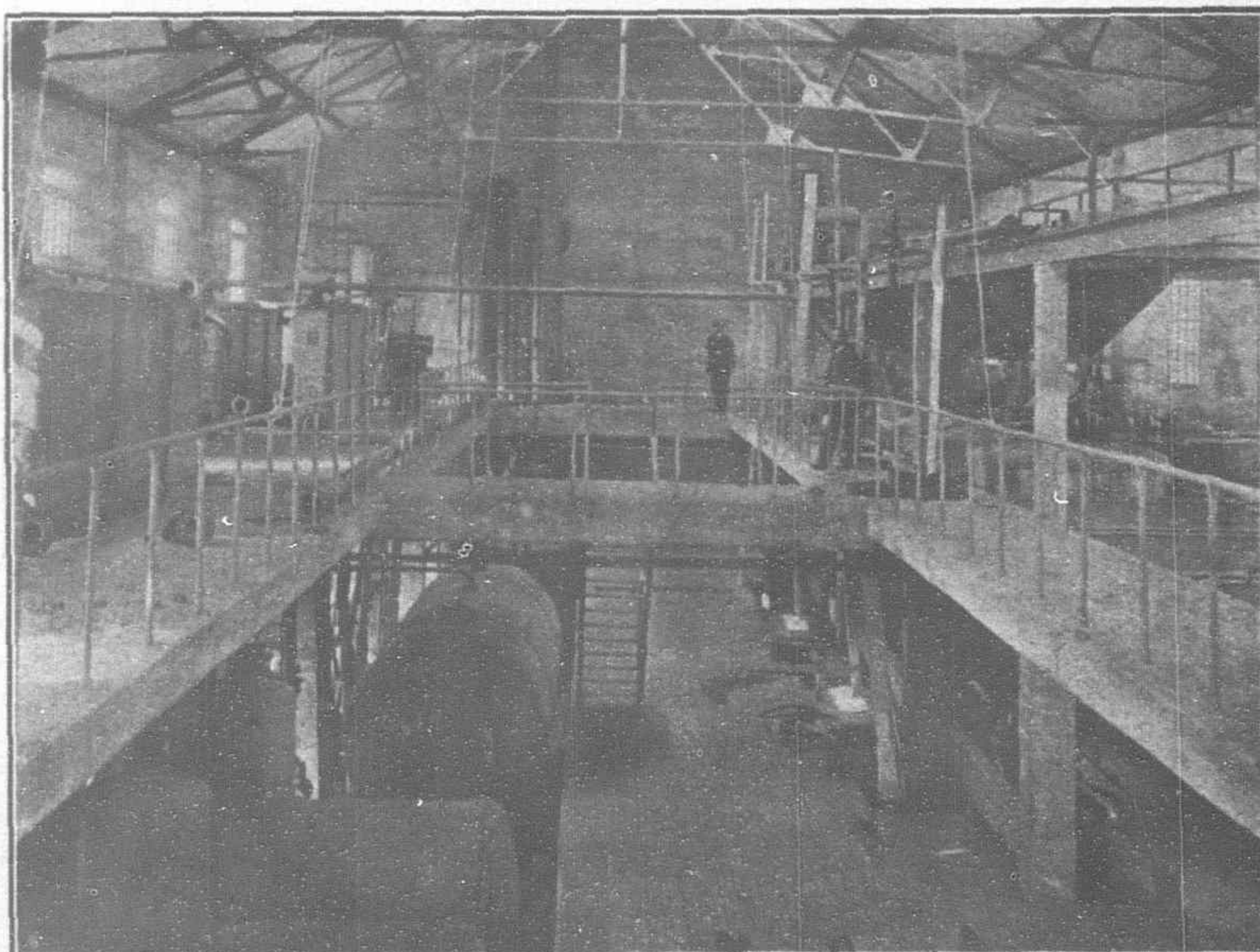
Advantages and Disadvantages of Different Processes

WEDGE, SCREW, AND HYDRAULIC SYSTEMS COMPARED

As already stated, the wedge pattern is the oldest by which system almost the whole of the oil expressing and other works at the mill are done



Interior of the Santai Bean Mill, Dairen



Interior View of Extraction Room, Santai Bean Mill

almost entirely by manual labor sometimes with animal help. Consequently it has only a limited producing capacity, while a comparatively large area is wanted for the site of the mill and for working room. Now that Bean Cake and Bean Oil have become world-wide commodities requiring a rapid and extensive production, so as to bring its price as low as possible, an out-of-date process like the wedge pattern might well be considered as having outlived its usefulness. Actually, along the S.M.R. Lines, at the chief centers, almost all larger plants have become mechanically equipped, and the increase in number of those that have installed the hydraulic pressure system, being further improvement on the screw pattern, might be accepted as only a matter of course. In Dairen, where an extensive production is kept up, most of the mills are possessed of the hydraulic pressure system.

However, for a small mill at a remote outlandish place, that has to fill only the local meagre need, the wedge pattern that costs only a small sum of money, may be worked at an economic advantage by the cheap native labor, and this mainly accounts for the presence of many wedge-mills in the country.

The screw pattern may be regarded as a transitory medium between the wedge pattern and the comparatively new hydraulic pressure system.

ROUND CAKE, PLATE CAKE, AND EXTRACTION SYSTEM COMPARED

Let us now compare the producing capacities of the different systems, the constituents of the different kinds of bean residua and their respective merits to their users.

TABLE VI.—PRODUCING CAPACITIES COMPARED

	Round Cake	Plate Cake	Extraction
Beans for material	100 kin	100 kin	System 100 kin.
Bean Cake	94.8 „	83 „	80 „
Bean Oil	10 „	12 „	14 „
Remarks :	gain in weight 4.8%	loss in weight 5%	loss in weight 6%

TABLE VII.—CONSTITUENTS OF BEAN RESIDUA COMPARED

By chemical extraction			
	Round cake	Plate cake	Bean meal
Water	16.8%	10.6%	10.4%
Crude fat	7.3%	5.7%	2.1%
Protein	40.1%	43.3%	45.5%
Carbon hydrate	24.6%	29.0%	24.2%
Fibre	5.8%	5.5%	4.8%
Ash	5.3%	5.9%	6.1%

ADVANTAGES AND DISADVANTAGES OF EXTRACTION SYSTEM

By the benzine extraction system, the oil percentage obtainable is 14 per cent. of the Beans used as material, the oil left in the residuum being reduced to only 2.5 per cent. or so. Besides, Bean meal is easy to handle and good to look at, and very convenient to be used, besides having a high fertilizing property. Therefore, it is 10-20 per cent. higher in price than round cake, etc. Only the chemical extraction system requires a complicated installation thereby fixing a large sum of capital. Besides, the dear price of benzine raises the producing cost. Moreover, because of its being in the form of meal, receptacles of some form are wanted for both storage and transportation, tending to raise the steamer freights all the higher.

In Manchuria, Bean Cake is handled in such an immense quantity, and bean meal with its limited production can not enjoy the benefit of the Mixed Storage System.

The Chemical extraction system, permitting of the largest oil percentage to be extracted, may be held as an ideal process, and when some day the solvent comes down in price, while Bean Oil goes up, and labor wages ascend higher, with the chemical extraction appliances better developed, this process is expected to grow very popular as the most commendable and progressive method.

ADVANTAGES AND DISADVANTAGES OF BEAN PLATE

As above seen, plate cake gives 12 per cent. or so of oil, retaining about 6 per cent. oil left therein. It is best suited for cattle-feed. Most of Beans exported to Europe and America at present are being expressed of the oil contents by this system.

Then, plate cake, compared with round cake, contains less water, the water percentage being only about 10%. Therefore, when plate cake is in increasing demand as cattle-feed on European and American markets, it will be found the best suited for a long and distant shipment through the Tropics without danger of deterioration in quality.

Only, plate cake, compared with round cake, requires a more intricate installation besides a higher pressure to be applied, and

while a kind of rush is good enough for wrapping the boiled beans with to be put under the press by the former process, bags knit of human hair, camels' hair, etc., that are quite expensive, have got to be used to put the boiled beans in, ready for the expressing machine. Naturally the producing costs run higher. Besides, plate cake being in the form of a rather thin plate of oblong shape, it is liable to get broken while in transit, and to protect it, it must be packed in gunnies. Moreover, Bean Oil produced at a plate cake mill being found to contain protein also, if subjected to a high temperature, it is liable to turn black in color, and for this reason, it has got to be refined. In short, whilst plate cake, because of its high quality and also of the larger oil percentage obtainable, is superior to round Bean Cake, yet the more intricate nature of equipments it requires wants a larger capital to be fixed, and besides on account of the higher cost of production from the causes above-mentioned, it has got to be quoted at least more than 20 per cent. dearer than round Bean Cake, making it less suited for the Japanese market, on which the assets of a fertilizer count everything at present. However, once plate cake grows more popular as cattle-feed in Europe and America, its manufacture will come to be acknowledged as quite a flourishing undertaking.

ADVANTAGES AND DISADVANTAGES OF HYDRAULIC PRESSURE SYSTEM

The round cake system, viewed from the oil percentage yielded and the quality of Bean Cake obtainable, may be classed as the more primitive than the two above-mentioned processes. The reasons why almost all the mills in Manchuria are being run on this system are: firstly because of the simplicity of equipments and manufacturing process, keeping the producing costs comparatively low; secondly because Bean Cake, being round and solid, needs no receptacles for the purpose of transportation or storage, and when loaded into cargo steamer, it will help to balance the relation between space and weight on board; thirdly because, in the Mixed Storage System, by which large quantities of Bean Cake are handled, some such simplicity in form and shape is deemed as highly desirable; fourthly because in a district like Manchuria, in which labor is cheap, the need of fine, delicate mechanical appliances costing heavily, as the case too often is abroad, is not felt so keenly, and to adapt native labor to the mechanical operations, the existing hydraulic system, by which Bean Cake is put out, is considered as quite well adapted to the present condition in Manchuria; fifthly because, in the present stage of general business, round Bean Cake may be made an object of forward contract transactions on the Exchange for Manchuria and Japan, while no similar thing can be said of bean meal. However, it has long been talked about among the enlightened classes that the round cake system is far from ideal and it is a matter of urgency to adopt a better and more economical process of obtaining oil that will meet better the new requirements of the Bean Oil and Cake markets.

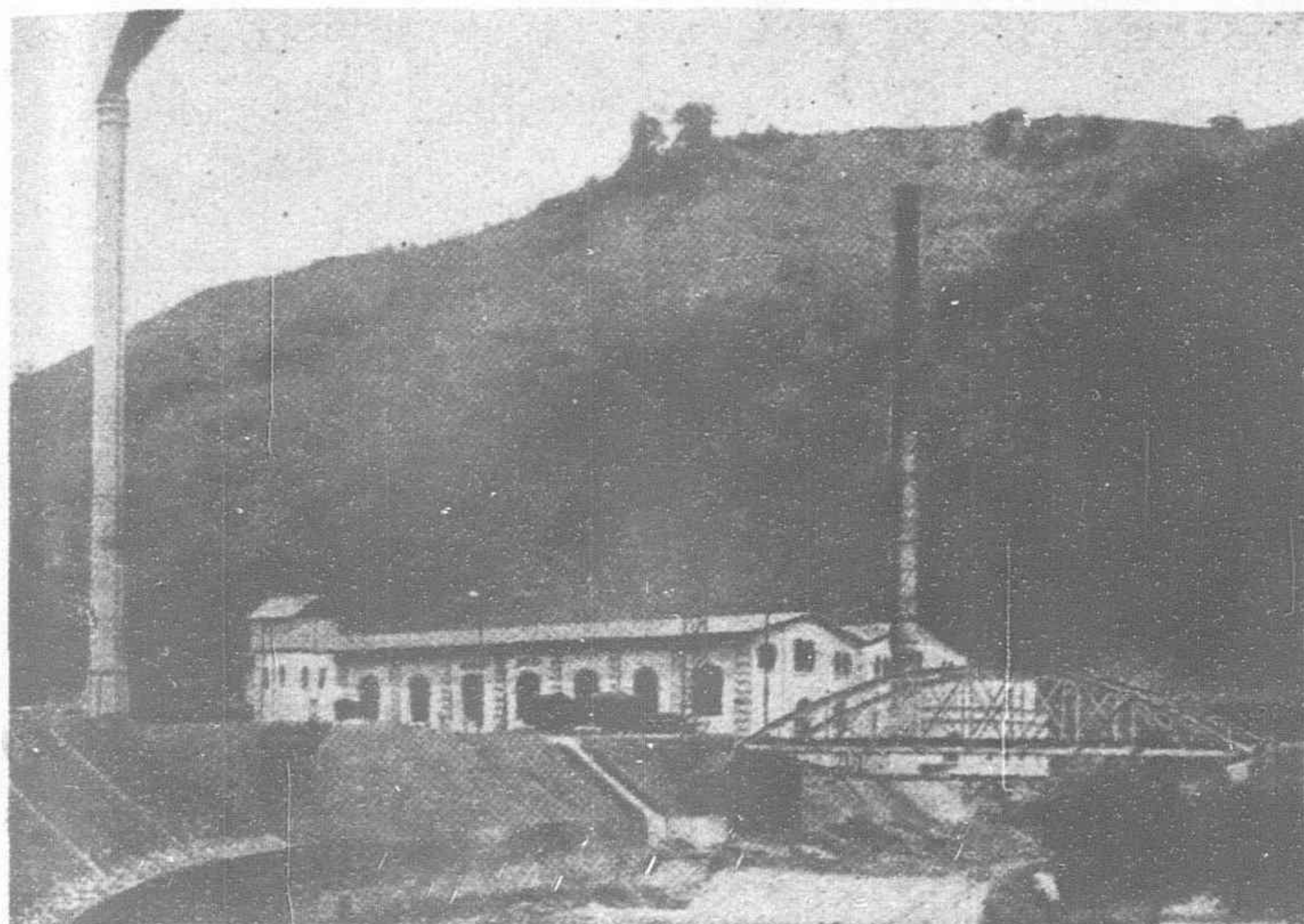
Bean Mills in Manchuria

Among the bean mills in Manchuria, Dairen and Harbin have plants equipped with comparatively advanced type of machinery, the others being almost entirely old-patterned. We shall now proceed to give the mechanical equipments of the leading mills in Manchuria, together with their producing capacities.

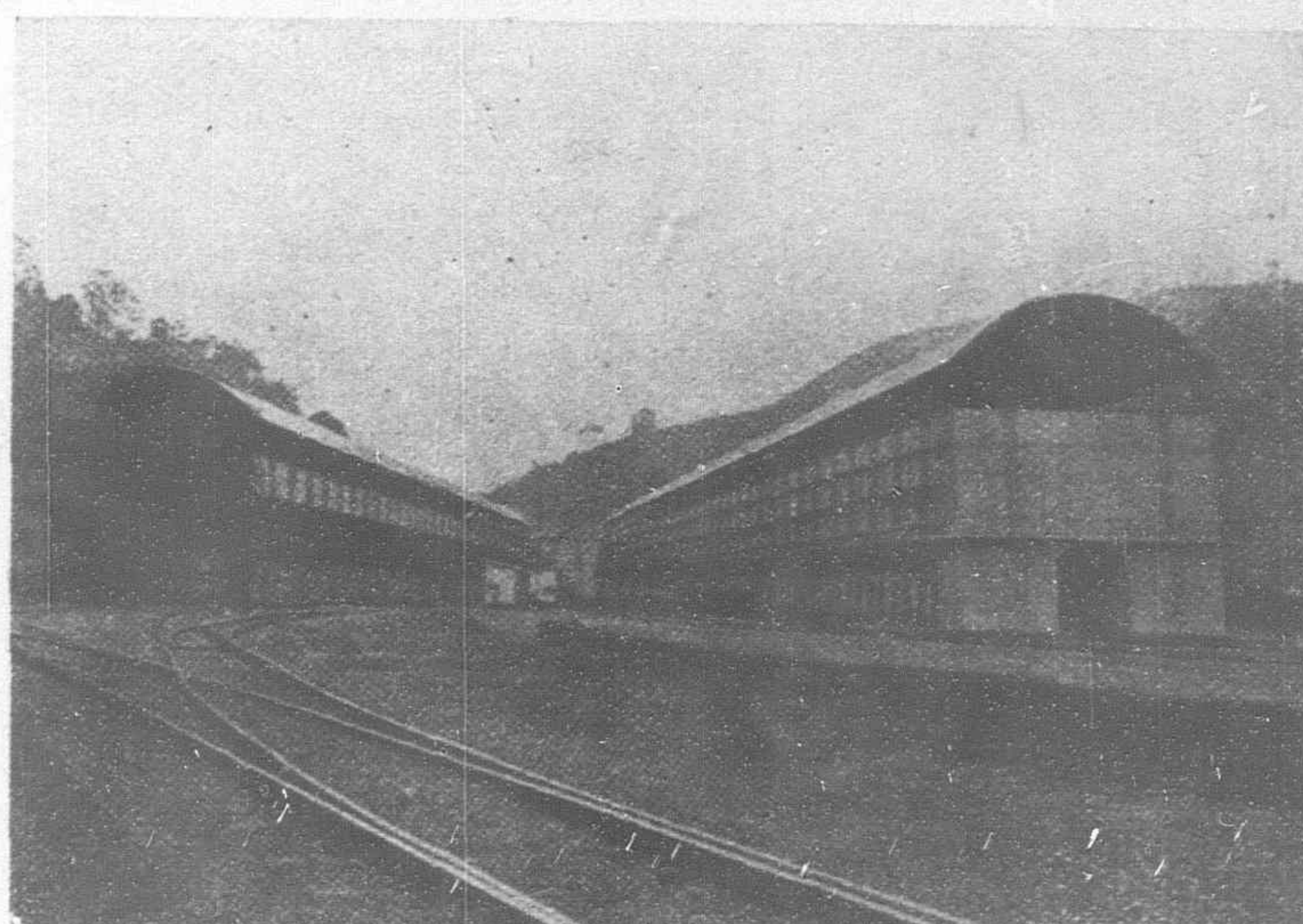
TABLE VIII.—BEAN MILLS IN MANCHURIA

	No. of mills	Hydraulic pressure system	Screw pattern	Wedge pattern	Daily producing capacity.	
					Bean Cake pieces	Bean Oil kin
Dairen...	86	1,873	3,067	—	226,461	1,342,305
Yingkou ...	22	20	726	—	21,790	108,950
Antung ...	24	100	1,077	108	40,025	200,125
Harbin ...	43	506	1,429	—	78,537	392,685
Along railways in North Manchuria	18	22	259	18	9,514	47,570
Along railways in South Manchuria	258	208	3,379	156	109,752	548,760
Total ...	447	2,728	9,937	362	528,097	2,640,395

Thus, in all Manchuria, there are 447 mills (the districts outside along the Railways being excepted) that are equipped with 2,728 hydraulic presses, 9,937 screw presses, and 362 wedge presses, turning out amongst them 528,079 pieces Bean Cake and 2,640,395 kin Bean Oil, and using about 18,000 tons Beans per day. The annual total production of Bean Cake and Bean Oil in Manchuria, subject to variation according to years, may be put at 60,000,000 pieces Bean Cake weighing 46 kin a piece, and about 200,000 tons Bean Oil.



Electric Power House at the Sawah Loento Coal Mines, Sumatra



Coal Storage Plant of the Ombilin Coal Mines at Emmahaven, Sumatra

Coal, Oil and Iron in the Dutch East Indies

THE object of this compilation is the desideratum to furnish some reliable data (statistical as well as historical), with regard to the principal mining enterprises in the Dutch East Indies, as also to point out briefly the existing opportunities for the further development or expansion of these mining industries.

Coal

The significance of the Dutch East Indies Coal Mining (more especially intended for the supply of the home market) only dates back about 20 years, when the "Ombilin" coal mine, on or near the West Coast of Sumatra, and belonging to the Dutch East Indies Government from the start, had advanced its production to 200,000 tons.

In 1913 the output of all the Dutch East Indies Collieries together amounted in total to 568,000 tons, (or which 404,000 from the "Ombilin" mine), the Import from various far-off countries at that time still amounting to 487,500 tons.

It was the war that has created a great change in this connection. In 1918 the total output was 833,000 tons.

In 1921, 1,200,000 tons, of which close to a million tons came from the three Government mines, and the output since then has been more or less stabilized at round-about 1,400,000 tons; a quantity sufficient for the consumption of the entire Colony, with

the exception of gas coal, which quality is not produced in the Dutch East Indies.

The estimated extent of the coal deposits in the Dutch East Indies, according to present investigations, is as follows:

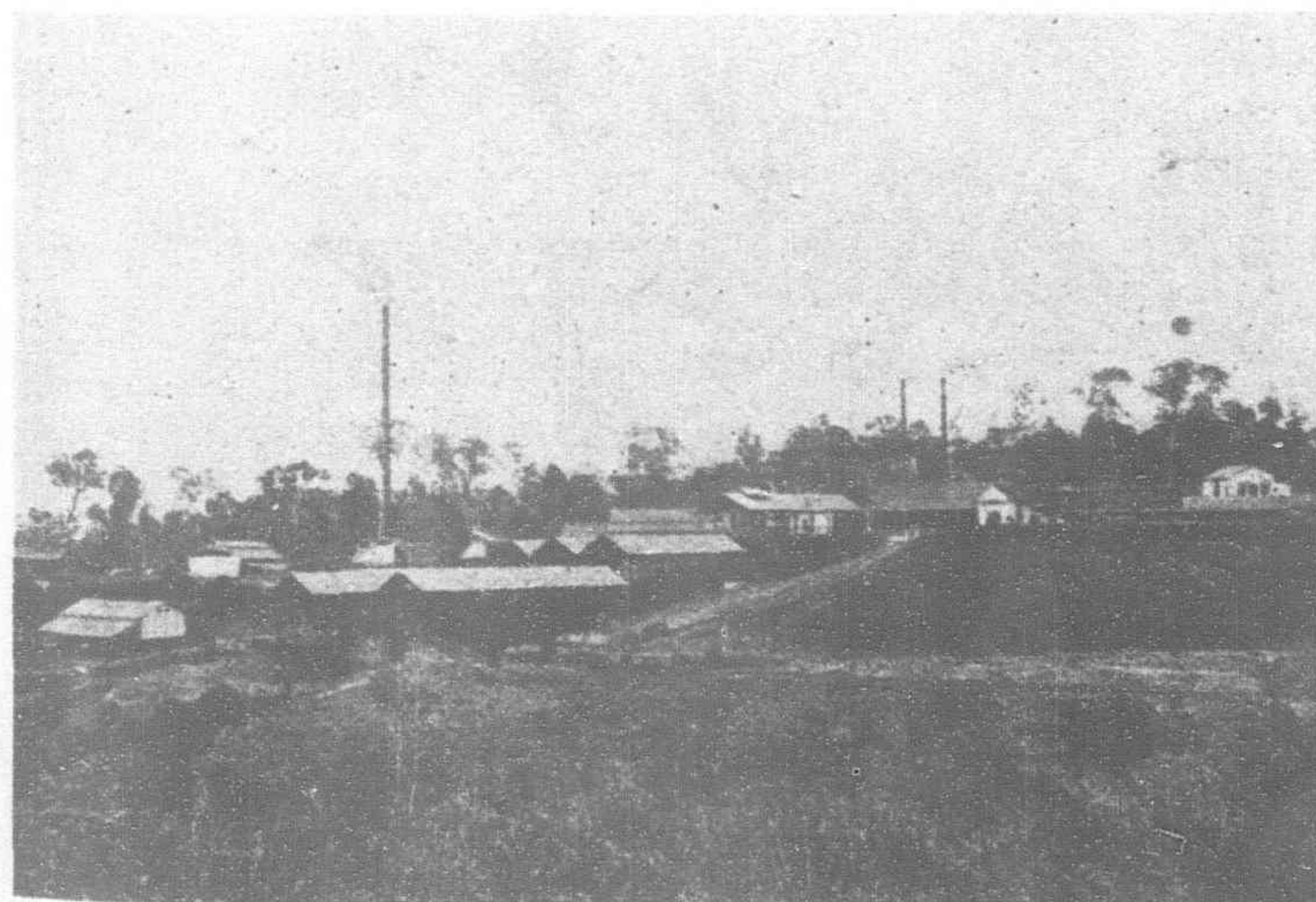
	Proven	Probable	Possible
Tons:	119,000,000	485,000,000	5,000,000,000

The Export of Dutch East Indies Coals, of any significant extent, only dates back from 1922, in which year the total export amounted to 25,000 tons. (In 1916, only 8,000 tons). Since that year, the export has gradually increased to:—in 1923, 133,000 tons; in 1924, 232,000 tons; in 1925, 272,000 tons; in 1926 to 538,000 tons.

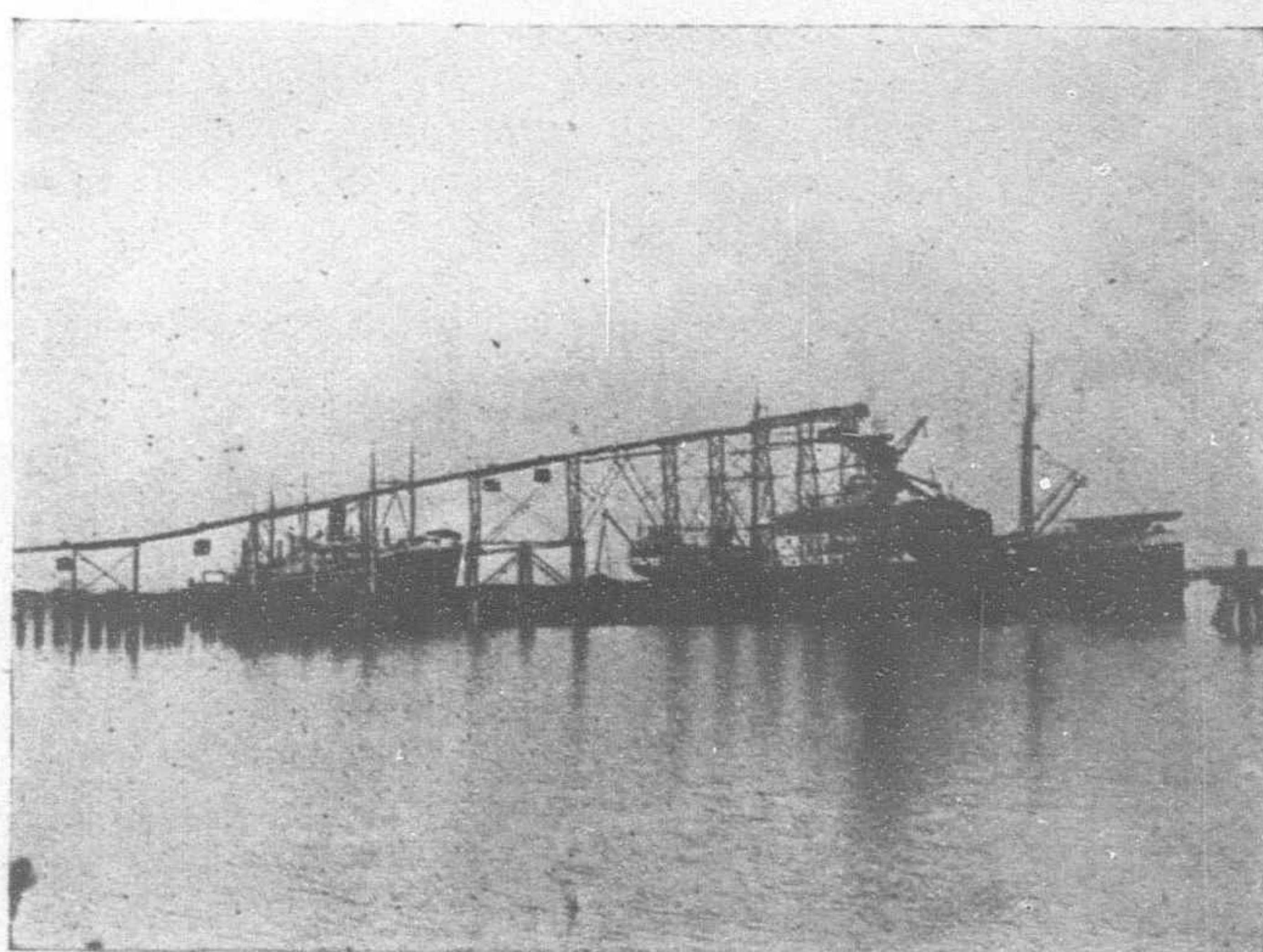
Coincidental with these figures, we might mention here that the East-Borneo Company, started in 1924 seriously the export of their coals to foreign markets.

In 1926 the total export of Dutch East Indies Coals already amounted to 404,000 tons, distributed as follows:

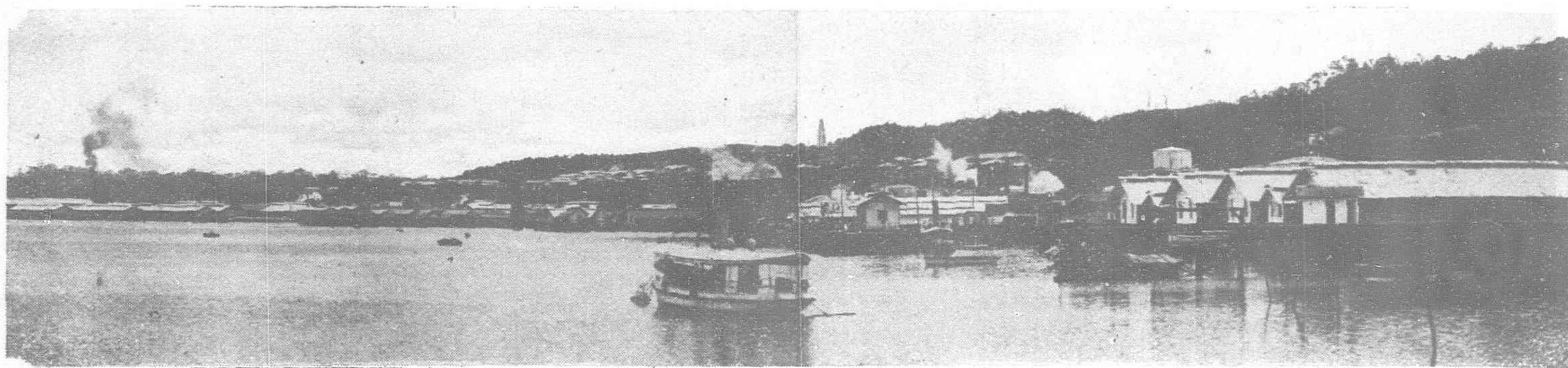
	Tons		Tons
Singapore	188,450	Hongkong	15,425
Malacca	6,756	Canton/Swatow ..	41,954
Penang	7,851	Philipp. Islands ..	27,898
Bangkok (Siam) ..	9,385	Various destinations	78,000
Saigon (Fr. Indo-Chine)	28,076		
			404,000



Poeloe Laoet Coal Mines, Borneo



Loading Coal at the Wharf of the Pulu Laut Mine



Royal Dutch Petroleum Works at Balikpapan, Dutch Borneo

In the same year the import of foreign coals had dwindled to only about 117,000 tons, for the major part Gas coals from Australia, viz:

Australia ..	.. 64,738 tons	(almost exclusively gas coals for the Gas factories).
China (Dairen) ..	.. 15,841 ..	
Japan ..	.. 14,534 ..	
S. Africa (Natal) ..	.. 12,929 ..	
England ..	.. 4,888 ..	(bunker coals for the English S/S Line).
Germany, ..	.. 4,570 ..	(bunker coals for the German S/S Line).

117,500 tons

We will now pass on to giving some more detailed information about the Dutch East Indies coal mines, participants in the afore-gone figures, accompanied by an average analysis of the coals mined.

OMBILIN. The Government mine, situated near the West Coast of Sumatra, close to Padang, the shipping port, is the first in importance and was started in the latter part of last century.

In 1908 the production amounted to 200,000 tons, in 1916 to 505,366 tons and is since

that time more or less stable at this figure, as will be seen from the following statistics:

1917, 508,226 tons	1922, 544,002 tons
1918, 504,201 ..	1923, 508,374 ..
1919, 510,821 ..	1924, 606,423 ..
1920, 567,142 ..	1925, 539,328 ..
1921, 602,853 ..	1926, 525,000 ..

The output of this mine is as good as entirely consumed in the home market.

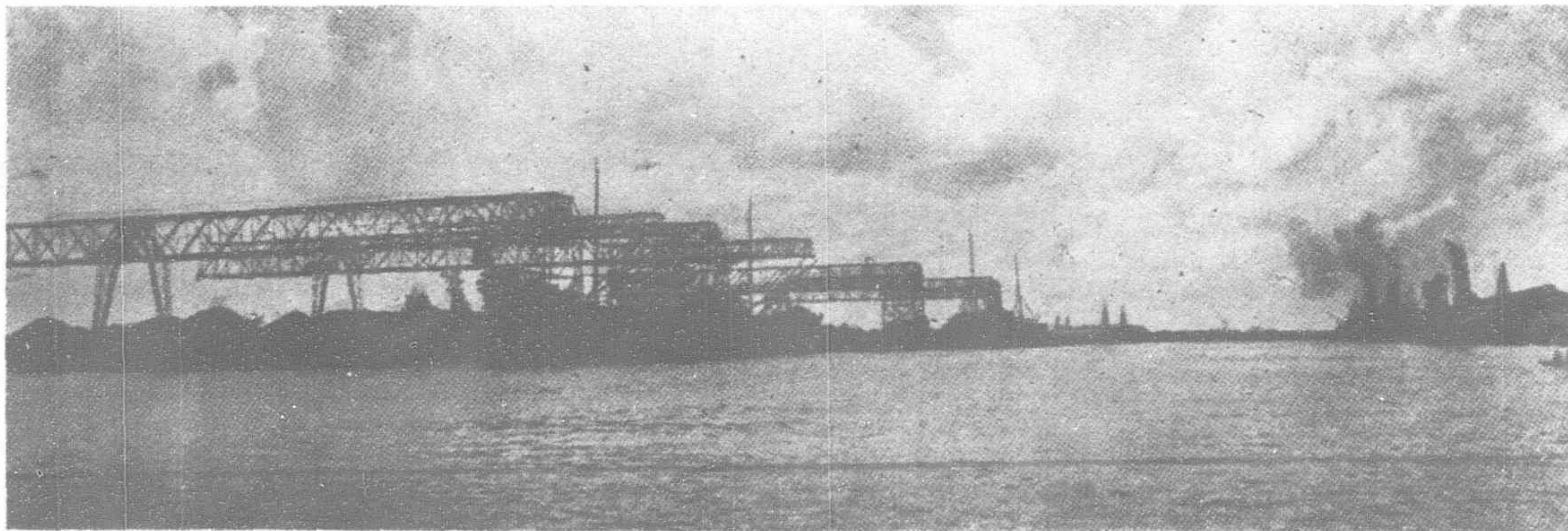
The average analysis of the Ombilin coal is:

Ash, 3%	Heat value about 7,000 Calories
Moisture, 7 to 10%	Volat. Matt. 38 to 42%
Fix. Carbon 50%	12,500 B.T.U.'s

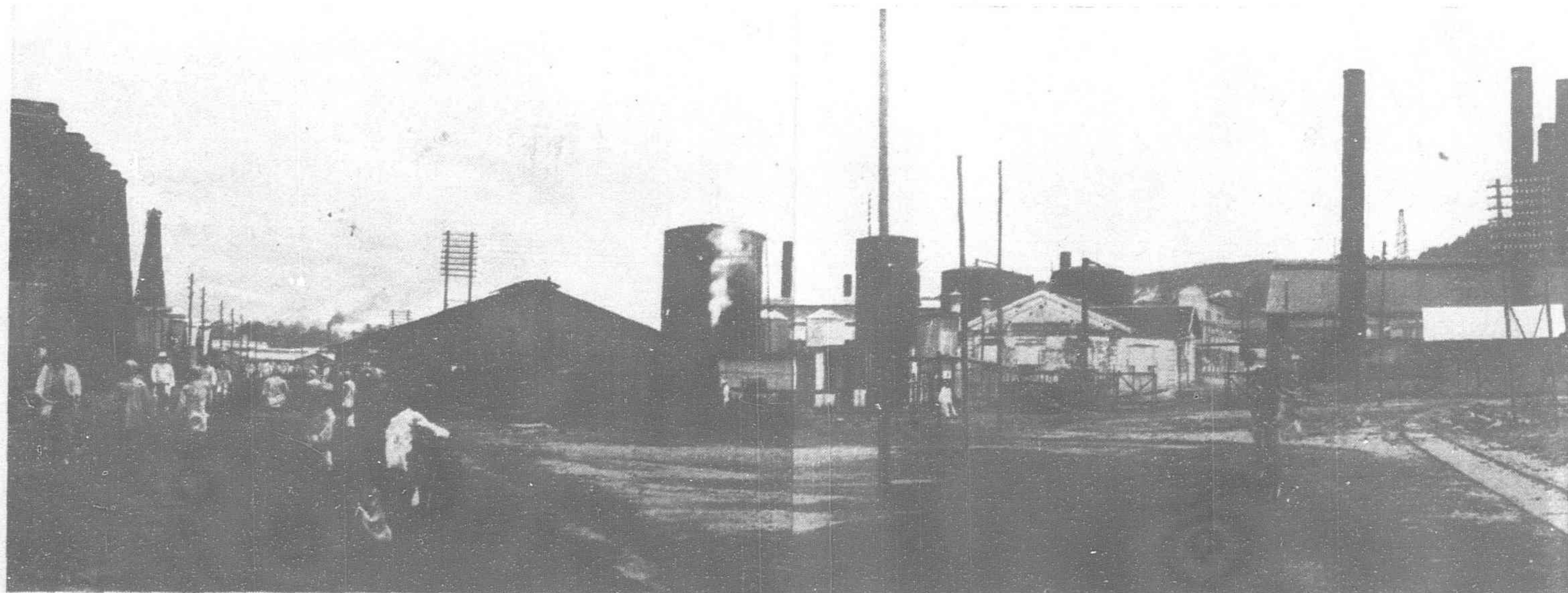
POELOE LAOET. The next Government mine in importance, but producing a grade materially inferior to Ombilin, is the "Poeloe Laoet" mine, situated on the island of the same name at the

extreme South East corner of Borneo. The coal is better known as "Stagen" coal, the name of the port of shipment.

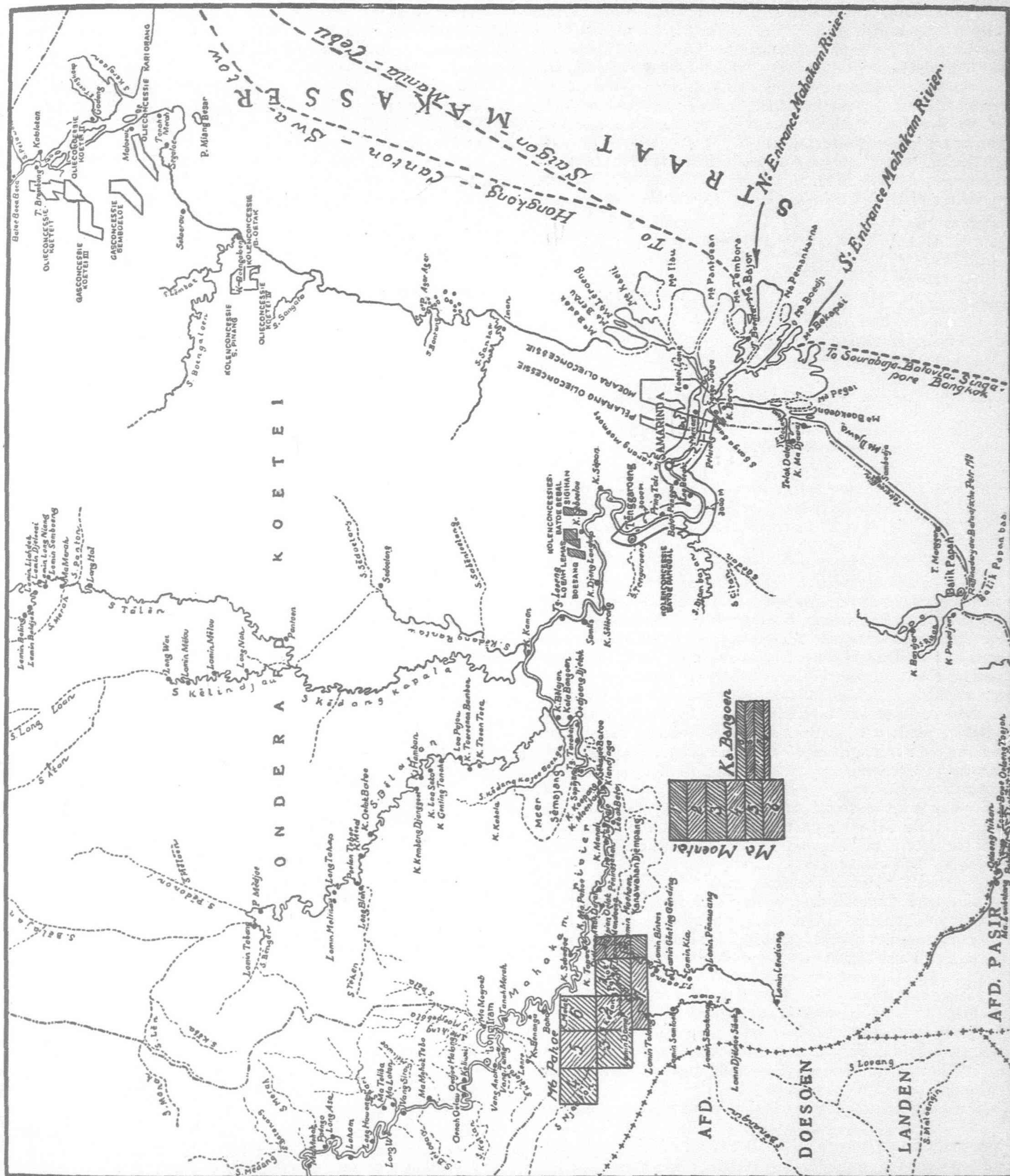
In 1912 the concession for the exploration of this coal field was taken over by the Government from a



Coaling Wharves at Tandjong-Priok



Main Plant of the Royal Dutch Petroleum Company at Balikpapan



Coal and Oil Concessions of the East-Borneo

1914, 128,505 tons	1920, 194,834 tons.	
1915, 127,200 "	1921, 224,518 "	(Seam No. 2 was
1916, 135,965 "	1922, 123,000 "	drowned in
1917, 132,432 "	1923, 143,980 "	that year.)

The Heat value	.. 6,200 Calories	6,600 Calories
	11,200 B.T.U.'s	11,900 B.T.U.'s

BOEKIT ASAM. The next and last Government mine is the "Boekit-Asam" coal field, situated on the East-Coast of Sumatra, near Palembang. This field produces the best coals, amongst which also one of the highest quality, the "Lematang" Marine coal, which is almost equal to Cardiff coal. However, the extent of this particular coal deposit is rather limited and the output of the Lematang is almost entirely consumed by the Dutch Navy; (Warships and Government steamers.)

The "Boekit-Asam" concession was taken over by the Government and opened up in 1919, at the price of 1,000,000 Guilders.

The production of this field has amounted to :

1919, 106,000 tons	1923, 175,000 tons
1920, 141,000 "	1924, 235,000 "
1921, 173,000 "	1925, 245,000 "
1922, 115,000 "	

The export of this coal in 1926 amounted to 85,146 tons, principally to Singapore, and some to Saigon, the remainder being consumed in the home market.

In 1925 there was immediately in sight for working, 2,000,000 tons.

The average analysis of the "Boekit-Asam" coals is given below, viz :

	Boekit-Asam coal	"Lematang" Marine Coal	
		Seam 1	Seam 2
Ash	2.4%	7.11%	2.5%
Moisture	8.15%	3.95%	4.0%
Volatimatter ..	37.85%	34.66%	40.0%
Fixed Carbon ..	51.60%	54.28%	53.5%
The Heat value	7,200 Calories	7,560 calories	
	ab't 13,000 B.T.U.'s	13,600 B.T.U.'s	

The next coal field of importance belongs to the East-Borneo Company, situated at Samarinda, port of shipment, East-Borneo, (Sales office Soerabaya-Java) on the borders of the big Mahacam river, accessible to steamers with a draught up to 17 feet. The coal shipped is more generally known as "Dyak" coal.

The principal coal concessions of the East-Borneo Company, extend on each bank of the big Mahacam or Kutei river over a width of 3,000 yards on each, both sides of the river, and along this river over a length of 45 miles, i.e. from the beginning of the delta up to 3 kilometers above stream of Tenggarong, the native capital of Kutei.

Besides these vast concessions the Company possesses other coal concessions near Seboeloe on the left bank of the Mahacam, 10 miles to the North of Tenggarong and also near Boengaloen river, half way to Sangkulirang Bay.

To convey a better idea of the Company's vast concessions, we might say that the Company's property and free holds extend over an area bigger than the Durham or Northumberland districts in England, and the deposits of coal found in this area may be estimated as wellnigh inexhaustible.

OIL. The important oil concessions "Moeara" and "Pelarang" have been ceded by the East-Borneo Company to the Royal Dutch or "Shell" against a royalty of Guilders 1.25 per ton of oil, but there are still various other important concessions and licences in hand and obtainable from the Company for purchase, viz : at Sangatta, Sekoerau, Sangkoelirang, Semboeloe and Sadjau.

The position of these concessions is shown on the accompanying map.

The production, shipments of coal and oil during the last seven years has been :

	Tons of Coal	Tons of Oil
1921	64,061	128,443
1922	82,120	245,454
1923	122,191	271,570
1924	171,775	169,595
1925	207,000	223,880
1926	233,594	175,453
1927	243,033	161,384

As shown above the development of the Company's Collieries only dates back a few years and the actual output already aggregates above 250,000 tons per year, whereas at the present moment important up-to-date improvements have been terminated, amongst which the erection of a big Electric Power Station for the electrification of the whole system of mining, haulage, pumping,

mechanical loading, traction and coal extraction, and the electric lighting of the townships of Samarinda and Tenggarong. Through these improvements it is expected that the output will be very soon very considerably increased.

As shown on the accompanying sketch, Samarinda is situated in the center of a radius of about 1,600/1,800 miles, and bearing this fact in mind, the Company started in 1923 seriously to compete in the foreign markets in from 5 to 8 days reach from the pivot center Samarinda. The export of their coal has developed so well in a very few years, that at present almost the entire output is being exported to foreign markets, less than one fifth of the output being reserved for Java.

The average analysis of the Samarinda, or so-called "Dyak" coals of the East-Borneo Company, is as follows :

Ash	3%	The Heat value :
Moisture	9 to 10%	7,000 calories,
Volat. matter	37 to 38%	or 12,600 B.T.U.'s
Fixed Carbon	50%	

The coal is remarkably free of dirt (ash and clinkers) and of sulphur. (0.8%)

The other private coal mining concerns in the Dutch East Indies of any significance are the "Goenoeng Batoe Besar"—Colliery, situated on Pamoekan Bay, on the East Coast of Borneo, and in the hands of a British concern, the Malayan Collieries Ltd., of Kuala Lumpur, Malacca Straits.

This concern bought the Goenoeng Batoe Besar concession in 1920 at the price of Straits Dollars 1,000,000.

The production amounted in :

1920, 7,445 tons	1924, 63,084 tons
1921, 15,595 "	1925, 73,000 "
1922, 28,252 "	1926, 85,000 "
1923, 59,309 "	1927, 99,000 "

The coal is principally exported to Singapore, Saigon and Hongkong.

This colliery has also in exploitation two seams, Nos. 1 and 2, of which Seam No. 2 is inferior to No. 1.

The analyses of these coals is as follows :

	Seam No. 1	Seam No. 2
Ash	4.0%	9.7%
Moisture	4.0%	5.65%
Volatile Matter ..	42.5%	37.8%
Fixed Carbon ..	49.0%	46.4%
Sulphur	0.5%	0.45%
The Heat value is ..	7,000 calories	6,800 calories
	or 12,600 B.T.U.'s	12,240 B.T.U.'s

The last private mining (coal) concern is the Beraoe-concession, belonging to the K.P.M. or Royal Netherlands Packet Steamship Company.

The coal of this field is of an inferior quality (Tertiaire-Miocene formation) not mined for sale or export, but exclusively for the supply of bunkers to the K.P.M. fleet of steamers, which requires annually 350,000 tons. The output does not yet cover these requirements and was in 1927 : 220,000 tons, or still 130,000 tons short, which shortage is being partly supplied by the Government and for a smaller part by the East-Borneo Company Collieries.

The concession was taken over in 1916, during the war period, by the K.P.M. (Royal Packet) and an up-to-date modern exploitation of the mines was started, which so far has absorbed an expenditure of 7,000,000 guilders. In 1920 the new pit "Rantau Pandjang" was started and gradually the old field abandoned. In 1924 a vertical shaft of armed concrete of 100 Meters (310 feet) was inaugurated and in 1925 the production reached already 143,297 tons ; in 1927, 220,000 tons.

The analysis of this coal is :

Ash	3%	The Heat value :
Moisture	11%	6,670 calories
Volatile matter	42%	or 12,000 B.T.U.'s
Fixed Carbon	44%	

Oil

BORNEO.—The oil bearing strata stretches out along the East-Coast from Balikpapan to the North, much farther than Samarinda. It starts from the most Southern point Balikpapan, where the B.P.M. (Royal Dutch or Shell) discovered oil in 1897 on

their first concession "Mathilde," and, as far as present explorations go, ends in the North on the island of Boenjoe, which concession, (North of Tarakan) since 1927 also is in exploitation by the Shell (B.P.M.) concern.

Indications of oil have been found all along the coast North of the mouth of the Mahacam river, viz: near the rivers Sangatta, Boengaloen, Sekoerau, on the island Miang, in the Bay of Sangkoelirang and the rivers Semboeloe, Sadjau and Sembakong. It is evident therefrom that expansion of the present oil fields is only a matter of time and further exploration.

The biggest oil exploring and exploiting concern is, of course, the B.P.M. (Royal Dutch or Shell). They started at the end of last century with their first concession "Mathilde" near Balikpapan, which was gradually extended with three more concessions to the North, viz: "Nonni" near Sambodja, "Louise" at Sanga-Sanga, and "Angana" at Soengei Mariam, and with two other concessions, obtained from the East-Borneo Company, one at Koetei Lama and another one near Sanga-Sanga "Moeara." They are also still working another concession of the East-Borneo Company at present, named "Pelarang."

On the last named concession they will start core-drilling shortly.

In 1911 they obtained from the East-Borneo Company two more concessions, one at Semboeloe and one at Sangkoelirang, named "Kariorang." "Kariorang" produced in 1911 a gusher delivering 24 tons per day, but for unknown reasons the two concessions were given back again later to the East-Borneo Company.

The production in 1924 of the four concessions of the B.P.M. (Shell) in the Balikpapan-Samarinda district was as follows:

From concession "Mathilde" ..	665 tons
" " "Nonni" ..	250,290 "
" " "Angana" ..	166,685 "
" " "Louise" ..	626,760 "
Total ..	1,044,400 tons

The concessions in the North, on the island of Tarakan, were given to the B.P.M. (Shell) in

1905, the concessions "Tarakan" 1 and 2
1917, " " "Tarakan" 3 and 4
1918, " " "Tarakan" 5

In 1916, 145 bore-holes had been drilled.

In 1924, 160 bore-holes were drilled, of which three gushers.

In 1924 concession "Tarakan" 1 produced 485,906 tons,
"Tarakan" 2 .. 465,563 tons,

Concessions "Tarakan" 3 and 4 were not yet producing, "Tarakan" 5 was not yet taken in exploration. In 1926 oil was struck on concession "Tarakan" 5.

In 1927 the Shell also started exploitation on the island of Boenjoe, taking over the concession from the Government, after oil had been struck against payment of 1,000,000 guilders to the Government and the Government keeping a joint interest.

The production on Tarakan island was, in 1925: 928,307 tons crude oil; in 1926: 876,428 tons.

SUMATRA and JAVA.—Besides the above exploitations, the B.P.M. (Shell) exploits other important fields on the islands of Sumatra and Java, viz: at Pangkalan Soesoe, at Palembang, at Pladjoe and in Djambi.

In Djamboe and near Pladjoe concessions have also been given to the Standard Oil Co., under the name of the Royal Netherlands Petroleum Co. (K.N.P.M.) and these latter fields are already in exploitation by the Standard Oil Co.

JAVA.—On this island the Royal Dutch (B.P.M.) has further oil fields, of minor importance, in exploitation; viz: at Tjepoe and near to Soerabaya. ("Lida" and "Kali Petiriman.")

At this junction we might mention that a few months ago three concessions of the East-Borneo Company have been transferred to the big Japanese concern, the Mitsui Bussan Kaisha, viz: "Kariorang" and "Koetei" 1 and 2, at Sangkoelirang Bay and river. The exploration work will be started next month.

Iron ore deposits and their possibilities in the Dutch East Indies

Prior to the present the Dutch East Indies Government has followed a parsimonious conservative policy with regard to Mining properties and Mineral exploration of the country, with the purpose in mind of either exploiting the mineral wealth of the Colonies

themselves, or otherwise preserving its exploitation exclusively to Dutch or National concerns. However, recently the Government has changed this conservative attitude, the past having shown to the Government how unprofitable and detrimental this policy has been for the economical expansion of the Islands and the quick development of the natural resources. The Government now has adopted the course of welcoming investment of foreign capital for the development of the mining wealth of the country. This is borne out by the fact of the valuable lease of oil-concessions in Djambi, Sumatra, to the K.N.P.M. (Royal Netherlands Petroleum Co.), which notwithstanding its name, is nothing else than a foster-child of the Standard Oil Company of America, as also by the recent lease to the Anglo-American Steel Co., Ltd., an English-American combine, working in close connection with the big American Steel concern, the CARSIL Steel Ltd.

The former has obtained a concession for the exploitation of the rich titanite iron-sand (metamorphe) deposits on the South Coast of Java.

A Company has been floated under the name aforementioned in London, with an authorized capital of 3,000,000 Pounds Sterling, of which one million Pounds have already been issued.

In connection with the above the following has transpired:

"Already in 1926 important quantities of the aforementioned Iron sand have been sent to Sheffield for the purpose of smelting trials.

These trials appear to have given most excellent results.

The iron sand proved to contain a large percentage of chrome nickel steel, extractable by electrolytic process and the mineral extracted was pronounced by experts of the very best quality, eminently suitable for the manufacture of high class steel bits, tools and materials for the motor and air craft industry, as also for such other materials and objects, which demand the highest properties of the metal used for their manufacture.

A special smelting plant is now in course of erection at Sheffield, intended as a testing plant. If this testing plant proves a success also, same will be extended and transferred to Tjilatjap, (South Coast Harbour of Java), where the Steel concern will start to make pudge, or pig iron out of the iron sand, in which form it will then be shipped to Sheffield for the further manufacture of the highly valuable chrome nickel steel."

All signs point in the direction that this new industry in Java will be started in the course of this year yet. According to insiders, the proposition has been studied from all angles, both technically and commercially and has been pronounced as safe and sound. Also the financial basis is of the same calibre.

At this juncture it may be useful to mention that vast deposits of this Iron ore have been proven to exist also on the South East coast of Sumatra, (the Lampongs), in South East Borneo and in the center of Celebes (Malili) close to the Towoeti and Matanna Lakes, in very close proximity to enormous water power, of which the island of Celebes is most prodigious.

The iron ore deposits in South East Borneo, at Soengei Doewa, have an extension of 17 Kilometers or over 11 miles and 160 million tons of this ore has been proven to exist, of which 30 million tons of coarse grain and 130 million tons of loamy sand. On another island in the near neighborhood of the aforementioned deposit, viz: the island Seboekoe, next to the coal bearing island Poeloe Laoet, (extreme South East corner of Borneo) another 300 million tons have been proven to exist.

Road Construction in Canton

At the direction of Mr. Lam Wan-koi, Chairman of the Canton Municipal Council, plans have been completed for the construction of a maloo to run from Taishatau to Tungshan, offering an alternative and shorter means of access to that suburb to the present route through Wai Oi Maloo and Pak Tse Road. Estimates place the cost of building at \$29,000, and this is to be provided out of the funds held for maloo repair work. Should this fund prove insufficient the Municipal Council is to consider other ways of raising money to meet the cost of construction. The proposed maloo is to run from the east side of the Canton-Kowloon Railway Station at Taishatau to the public park in Tungshan, passing along the south side of the railway line and Miao Chin Street in Tungshan. This maloo will be thirty feet wide, and it is proposed to use bituminous surfacing.

The Airway Between Holland and India

By A. Zimmerman in "Inter-Ocean"

THE services of the Nederlandsch Indische Luchtvaart Maatschappij (The Netherland India Airways Limited) were formally opened to the public last winter. This is certainly a fact which deserves more than passing attention, as the Netherland Indian Colonies are the first colony of a great European power to have a well organized and fully equipped civil air communication service which from the present small start will gradually be extended till it covers practically the whole of the archipelago. The aerial equipment of the Airways service is at present composed exclusively of the famous three-engined Fokker monoplanes, which are used for the greater part by the air services in Europe and elsewhere. The head offices of the operating company are in the Hague, but its field of endeavor is restricted to the Netherland Indian islands.

The K.N.I.L.M. is a sister organization to the K.N.L.M. The Royal Dutch Airway Limited which indeed bears the relationship of elder sister and in a truly sisterly way can help the younger company with the fruits of her vast experience in navigating one of the most extensive air services on the Continent of Europe for the past ten years. Indeed it is only within the last year that the K.N.L.M. has had to concede priority of mileage to the Imperial Airways Limited and the Deutsche Luft Hansa. Not the least of the services so rendered to the younger company by the older was the furnishing of its pilot personnel. And since all the pilots of the K.N.I.L.M. were recruited from the ranks of the K.N.L.M. it followed that they were thoroughly conversant with the mechanism and working of the Fokker planes. K.N.L.M. has used Fokker planes during the entire post-war development period when the planes were undergoing the great modifications that have resulted in their present excellence. Most of the flying experience of the pilots was, therefore, gained on Fokker planes and for that reason it was quite natural for the K.N.I.L.M. to open its services with planes that would be familiar to both pilots and mechanics.

When the preliminary work of organization had been completed and the K.N.I.L.M. had become a fact, thanks to the efforts of the large steamship companies and the banks, there arose the problem of how to transport the planes that were to be used there out to India. There were two possibilities, they could be dismantled and shipped by steamer or they could be flown to their destination, had a simple calculation of the costs showed that there would be little difference either way. Therefore, trusting in the skill of the pilots and in the excellence and endurance of the machines it was resolved to transport them in their own element and take them out through the air.

This daring deed was not so risky as the layman might think, inasmuch as there had been a mass of experience gathered by Dutch pilots on former air-voyages from Europe to the Indies. Already, in November 1924 there had arrived in Java a Fokker passenger plane which was flown by Thomassen à Thuessink van der Hoop, and van Weerden Poelman with van den Broeke as mechanic. Two other flights proved that the connection between Holland and India did not exist only in imagination, for in 1927 a one-motor Fokker of the K.L.M. chartered for that purpose by the American millionaire, van Lear Black, flew from Amsterdam to Batavia and back; shortly after that a three motored Fokker made the flight in record time piloted by the well-known Captain Koppen.

These three flights had supplied the K.L.M. with an enormous mass of experimental data about the routes, the conditions of the atmosphere, the weather conditions likely to be met with, the landing fields that would have to be used *en route* and other matters, so that the Dutch pilots who had to fly the five machines to India were unlikely to encounter new difficulties. A contract was made with the Postal Service in which it was stipulated that the four machines destined for the public service of the K.N.I.L.M. would carry mail to India and by a second contract the K.L.M. was allowed to carry mail on twelve special through flights to India during the year 1929.

The first aeroplane destined for the Indian air service departed from Amsterdam on September 13, 1928, and arrived in Batavia twelve days later. The second plane departing a week later covered the distance within eleven days.

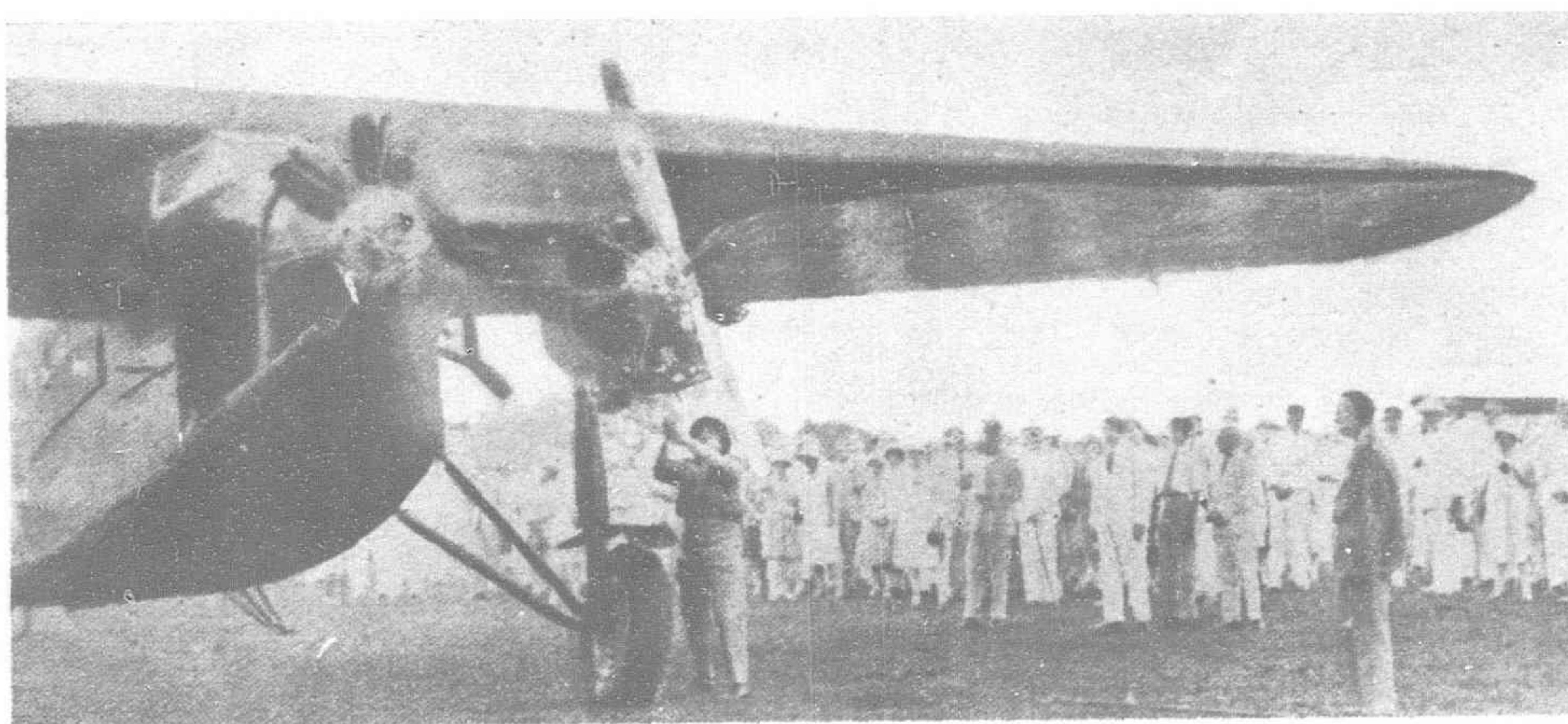
The third and fourth met with misfortune; for one of them had to make a forced landing at Cawnpore, in British India, when one of the wheels collided with haystack, as a result of which the wings were severely damaged. The fourth machine with spare parts for the third plane and also a mechanic from the Fokker factory came to the aid of the third plane and brought the parts safely to her sister plane. But on proceeding towards India it, too, met with disaster two days later in Rangoon, where, in attempting to take off, one of the wheels caught in a deep hole in the ground and the machine was so severely damaged that it had to be dismantled and forwarded to Java by sea.

Without doubt these two misfortunes are ascribable to the bad condition of the landing fields, that in Rangoon being the race course, far smaller than the usual dimensions, so that it is nearly impossible for large machines to start or to land there. The plane which came down in Cawnpore was repaired on the ground and then flown to Calcutta where it, too, was dismantled and brought on to Batavia

by sea. This was done because the K.N.I.L.M. did not wish to risk any more of its precious planes on the poor landing fields provided by the British in Burmah.

Meanwhile the fifth plane had started from Amsterdam as a mail plane for the K.L.M. and with a short stop at Baghdad for tightening up the motor attachments to the chasis which had been worked loose by the great vibration, it accomplished the long journey from Amsterdam to Batavia *vice versa* without further incident. And this is how the K.N.I.L.M. got the four machines from Holland to Java with which she started air service all over the island.

However, during her first month's service, she does not seem to be under a lucky star, for the original plan of starting with a daily service between Batavia, Surabaya, and Bandoeng had to be altered a day or two before the official date for opening the service owing to the landing field at Surabaya being unfit for use with such heavy planes. Therefore, for the time being, the Company had to be satisfied with the routes from Batavia to Bandoeng and from Batavia to Semarang and *vice versa*. This was a great disappointment to the officials for it was just the route from Batavia to Surabaya that had aroused the largest expectations in the hearts of all. Efforts were made at once to try to find a more suitable landing field, but up to the present time this had not been accomplished. It is hoped to construct such a field, however, within a comparatively short time.



A K.N.I.L.M.—Plane in the Batavia-Semarang Service

The great plans of the K.N.I.L.M. are to extend their services to such an extent as to get routes, using Batavia as a junction point, between Singapore, Medan, Deli, Palembang, Bandoeng and Surabaya, whilst a further plan exists to draw the Lesser Sunda Islands within the regular air service and thus to forge the necessary link with the Imperial Airways Limited passing through British India and also connecting with the newly formed Australian Air service.

If there is any country in the world offering unlimited demands for aerial communication it is Netherland India. There are tremendous distances to be covered, which is most clearly demonstrated by the fact that the journey from Batavia to Medan by ship takes four days while that by aeroplane takes only eight hours. What better proof could be adduced than this as to the crying need for far-reaching air connections in the archipelago?

The K.L.M. has grown within ten years from a very small beginning to one of the greatest air service corporations in the world and it is therefore to be hoped that the K.N.I.L.M. will prove that she has in her veins the same blood and will in her turn make an equally rapid rise among the services of the Orient.

It is impossible to prophesy the outcome of the regular line between Holland and India. The flights up to the present have served to show that the organization of landing fields through Further India is still far from ideal. No landing or starting can be

executed except in the larger centers without risk and the accidents to the two machines have proved that this danger is very real and not imaginary.

Meantime, the Imperial Airways Limited have formulated the plan of a regular connecting air service between London and the different parts of the British Empire. It is not at all impossible that this fact will prove to be of great influence on the amelioration of the landing fields in the more remote British colonies. The Imperial Airways are also using very large and heavy machines of the same capacity as the Dutch planes, so that if the fields are improved to meet the needs of the British company they will certainly more than meet those of the Dutch Mail Planes.

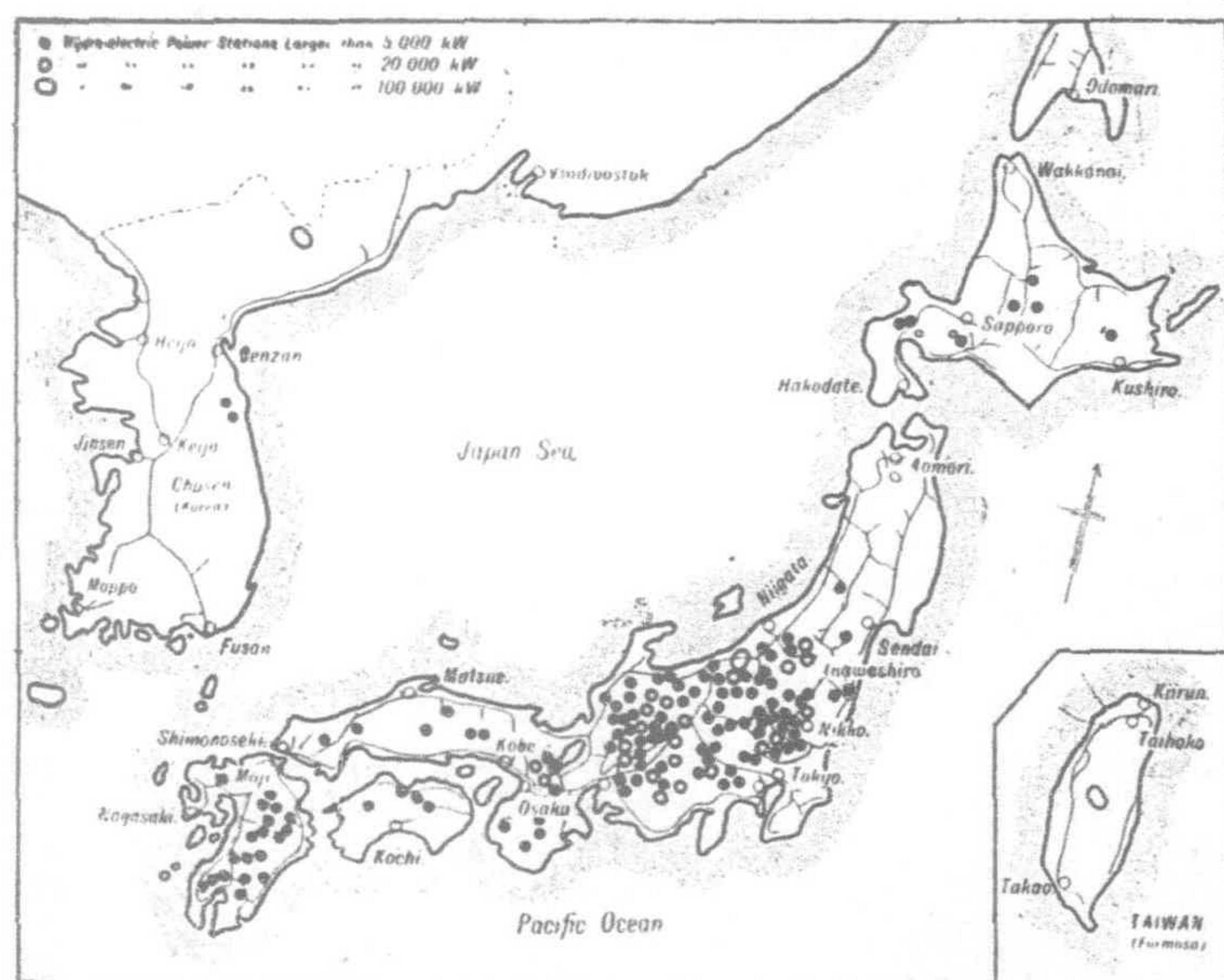
The success of the Dutch pilots so far has been entirely due to the excellence of the materials built into the planes they have used and to the careful selection of the most efficient personnel to handle these planes. Many times during the journey from Holland to India the machines had narrow escapes, and to avoid this danger it will be necessary not only to improve the existing landing fields but also to construct emergency landing places at various points of vantage along the route. Here is an ideal opportunity for international co-operation between Great Britain and Holland to render the distances between the mother countries and their various colonies shorter and ever shorter.

Development of Hydro-Electric Works in Japan

By S. Tanabe

THE construction of the Kyoto Municipal Hydro-electric Works of the Lake Biwa Canal in 1891, marked the beginning of an epoch not only in Japan. At that time 220 volt and 500 volt continuous currents were employed for the distribution of electricity for lighting and power near the power station, and 2,000 volts alternating current for distant electric lighting.

In 1898 an hydro-electric power station supplied light and power to the City of Hiroshima, 13 miles distant, by an 11,000 volts transmission line.



"The Engineer"

Fig. 1

From 1905 the progress became very rapid on account of the increase of demand and the adoption of high voltage transmission.

In 1912 a second Lake Biwa Canal was completed and the pioneer power station was enlarged. In 1915 Inawashiro water power plant transmitted energy by an 115,000 volt air line to Tokyo, a distance of 140 miles.

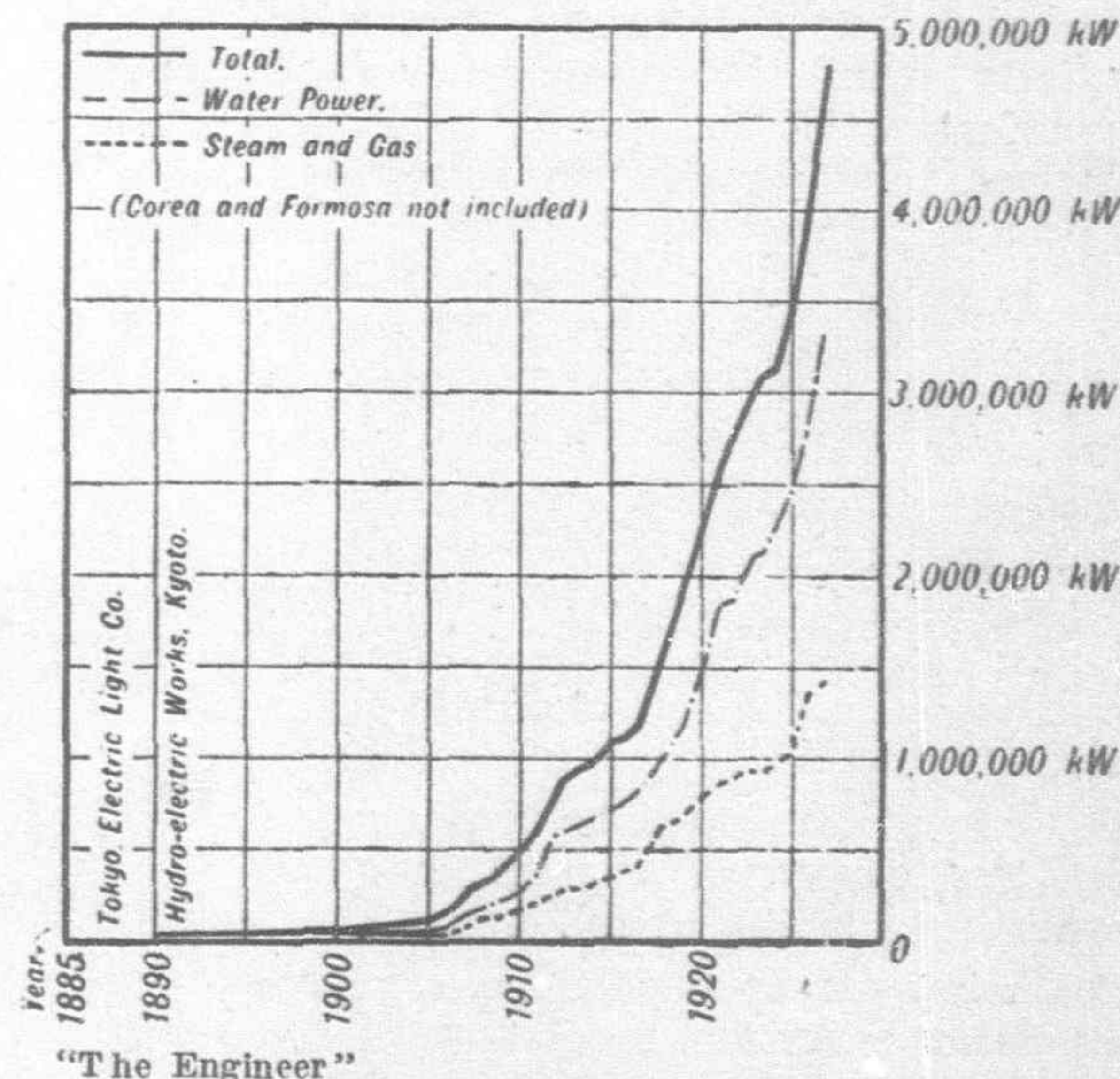
As shown in Fig. 1 and 2 hydro-electric works are making notable progress in Japan. At the end of March, 1927, there were more than one hundred hydro-electric power stations larger

than 5,000 k.w., and including those to be completed in the near future, there will shortly be installed over three million k.w., which is about one-third of the total economic available power in Japan:—

	Water power k.w.	Steam and other k.w.	Total k.w.
Completed...	1,965,970	1,236,644	3,202,614
In construction ...	1,426,611	222,438	1,649,049
Total ...	3,392,581	1,459,082	4,851,663

The length of line conductors, including those for electric railways, is 135,236 lineal miles, with an aggregate length of 442,649 miles; and in the year 1926 the total output was 9,091,211,608 k.w.h. of which water power accounted for 89 per cent., steam for 10.9 per cent., and gas for 0.1 per cent.

In the above figures Formosa and Korea are not included. In Formosa, out of a total 25,000 k.w., about two-thirds are generated by water power. The construction of a big water power plant of 140,000 h.p. was begun some years ago, but on account of the economic condition, the work was postponed, but is now in process toward revival. In Korea, out of a total output of 35,000 k.w. only one-fourth is now produced by water power, but a large water power station of 120,000 k.w. is approaching completion in North Korea.



"The Engineer"

Fig. 2.—Output Curves

The Oil Engines of Petters Limited, Yeovil, England

Oil fuel is now obtainable at economical prices in practically all countries of the world, and although opinions differ as to the supply of natural oil in the future, such in the main are very optimistic. Some experts assert that such resources are vastly in excess of those of coal, and this fuel itself possesses a very large proportion of oil equally suitable for use as fuel in internal combustion engines.

For industrial and marine purposes the steam engine is rapidly becoming a thing of the past. The efficiencies obtainable with steam engines are not to be compared with those of the oil engine which requires very small space, needs no steam boilers nor expensive handling of fuel. The internal combustion oil engine can be started up at any time without the preliminary delays of firing up which are inseparable from steam engines. Where oil engines are concerned, the charges for attendance and of running costs are limited to actual working hours.

For some years past manufacturers have devoted themselves to the development of the internal combustion engine and to the problem of making it efficient. One of the pioneers in this direction is the firm of Petters Limited, Yeovil, who have taken an important part in such development. The oil engine industry was in its infancy when this firm made their first engine in 1895. This was a four-stroke cycle engine and was the prototype of the modern four-stroke engine. Petters Limited, however, foresaw that the future of the oil engine lay in improved simplicity of design. In 1910, after a series of experiments extending over a number of years, a Petter Engine of the two-stroke type was placed upon the market, and in 1911 a Petter Engine of this type was awarded the Grand Prix and Gold Medal at the Turin International Exhibition.

For some years the firm made most exhaustive tests on both four-stroke and two-stroke engines, with the object of giving each the most thorough trials in order to be in a position to compare the respective merits of each and their suitability for industrial and other purposes. In both types of engines they embodied the very highest of workmanship and the best quality materials. In 1915, after a series of the most exhaustive experiments, they were convinced that the advantages of the two-stroke cycle over the four-stroke were so great that they decided to discontinue the manufacture of four-stroke cycle engines altogether, and from that date they have concentrated entirely upon the development and manufacture of the two-stroke Petter Engines, and they have never had reason to regret their decision.

It is not our object to institute a comparison of the two-stroke and four-stroke cycle engines, to the detriment of the latter, but it may be well to state what are the main differences between these two outstanding types, and to enquire into the reasons which Messrs. Petters Limited had for their decision to discontinue the four-stroke in favor of the two-stroke type of oil engine.

The outstanding differences between the two classes of engines may be summed up briefly as follows:

A four-stroke engine has a power impulse at every two revolutions of the crankshaft or four strokes of the piston.

A two-stroke engine has a power impulse at every single revolution of the crankshaft or two strokes of the piston. The two-stroke Petter Engine entirely eliminates inlet and exhaust valves with valve gear and similar complications which are inseparable from four-stroke engines, and are very often a source of trouble and breakdown.

For it must be remembered that engines are used very often under conditions and in geographical positions which make it an extremely expensive matter to obtain the service of a mechanic or engineer to put them right in the event of a breakdown. For such a reason it is highly important that the engine should be of the simplest possible design, easily worked and understood even by native labor, and capable of being put right in the event of breakdown without having to go to the expense and delay of obtaining technical assistance.

The Petter Engine therefore, developed on improved lines of design and making full use of its characteristic two-stroke principle, has now reached the degree of perfection which places it practically in a class by itself.

The elimination of valves from the two-stroke engine dispensing with the troubles attendant upon their working, allows for a simple cylinder head casting in which there are only two openings, one for the fuel inlet and the other for a starting device. The danger of cracked cylinder heads,

therefore, is very much less in the two-stroke cycle engine. The absence of valves working in the high pressure and temperatures of the combustion chamber, and the elimination of the potential sources of leakage and loss of efficiency inseparable from this system, are factors of very great importance in the Petter Engine.

A glance at the sectional illustration of the Petter Atomic Diesel Engine which we reproduce, and which will be referred to later, reveals the extreme simplicity of this engine. It will be seen that there are only three working parts in the cylinder: the piston, connecting rod and crankshaft. It is not difficult for an entirely unskilled man to operate this engine after a little practice with complete success.

Due to the impulse per revolution of the crankshaft of the Petter two-stroke engine, its cyclic variation is very low; as a consequence it is particularly suitable for generating electricity and similar duties. It has a totally enclosed design—all working parts being completely protected.

The factory in which these engines are manufactured is probably one of the largest devoted to such a purpose in the British Empire. A visit to the works enables one to realise that to be connected with engineering does not of necessity mean being confined to a purely industrial locality in the smoke of a great city. The Westland Works of Petters Limited, Yeovil, are situated in beautiful scenery on the outskirts of that growing Somerset town. Many hundreds of workers receive continual employment in an establishment laid out on the most up to date manufacturing lines for the production of the "World's Best Engine" under conditions which make for that contentment and happiness without which no industry

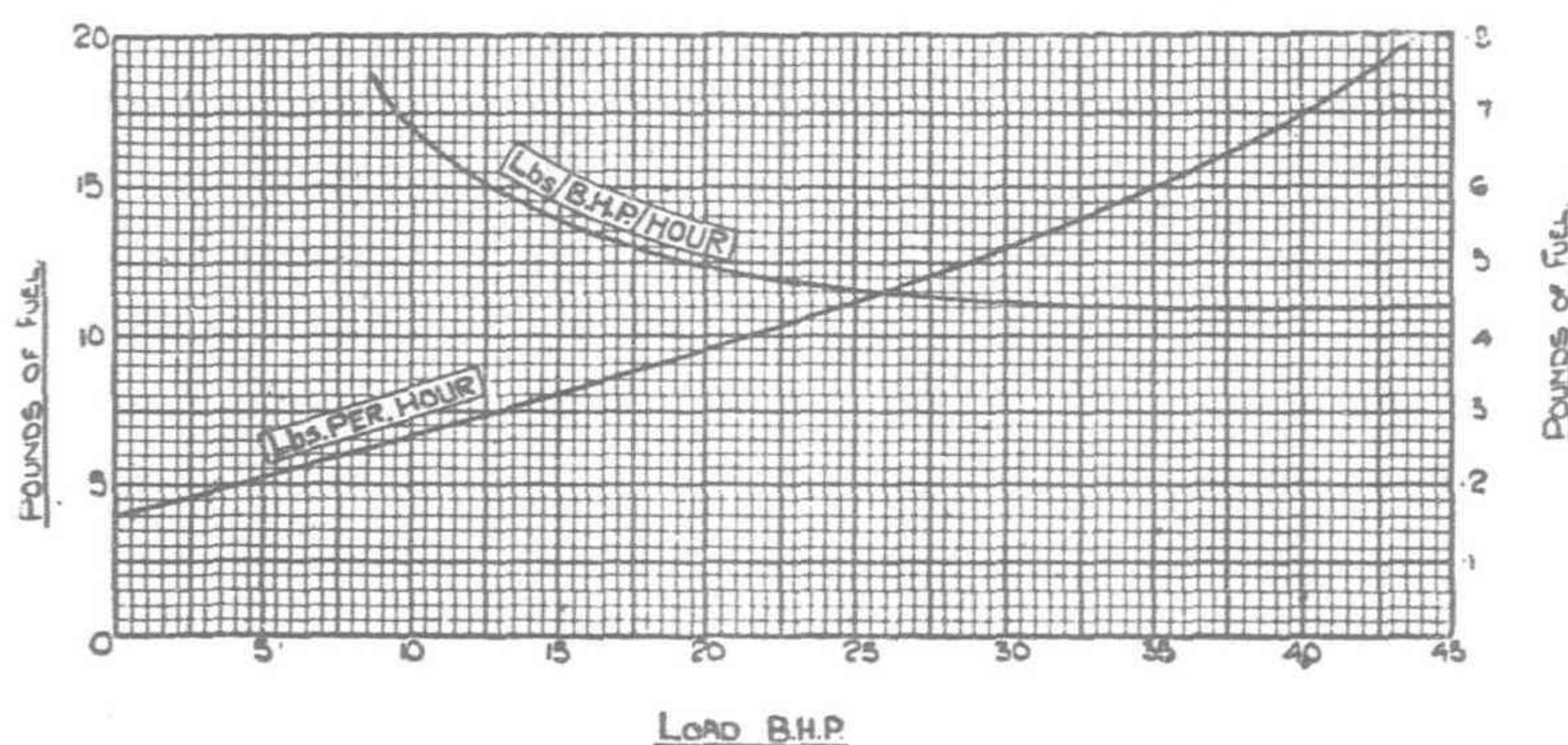
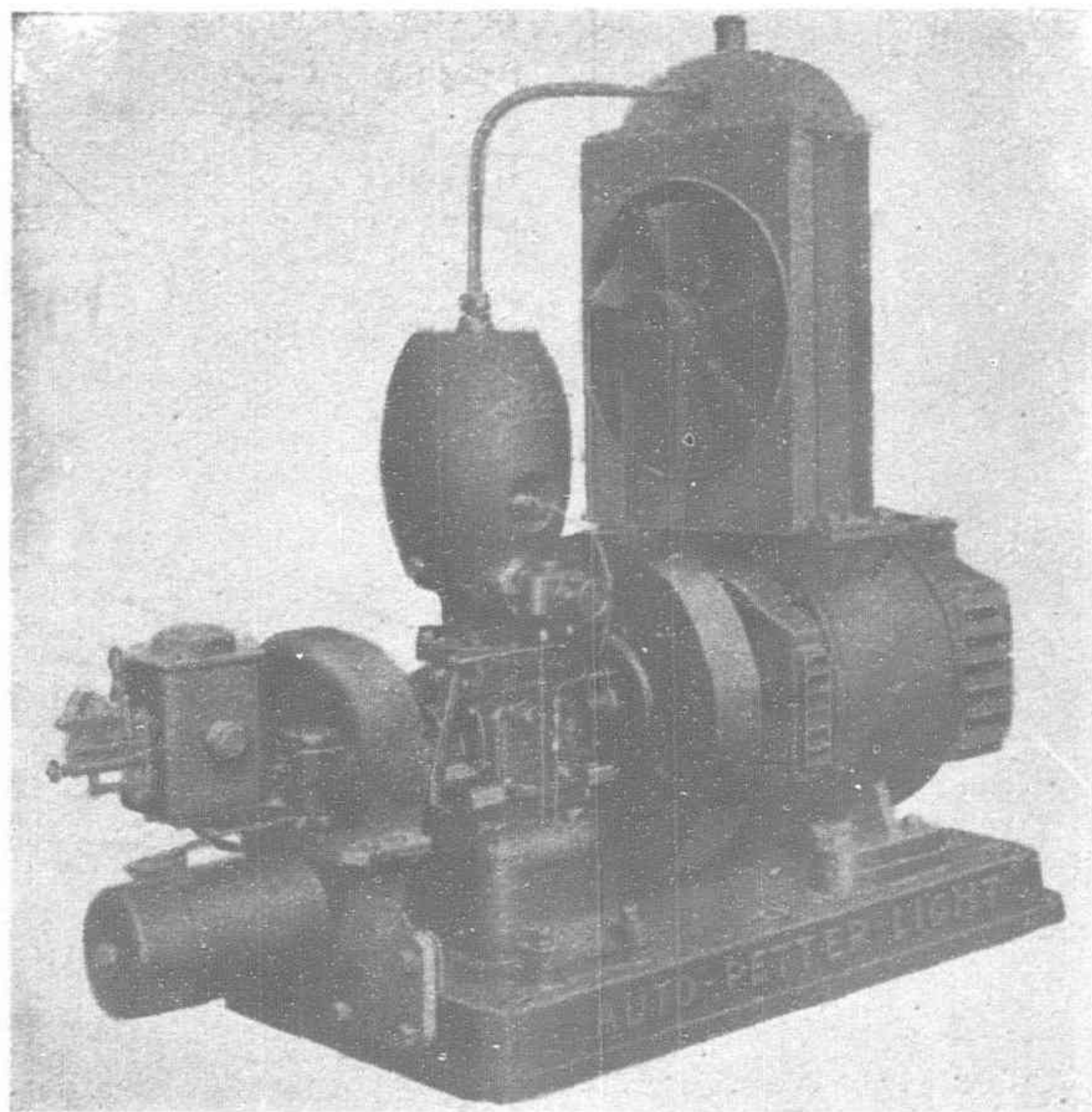
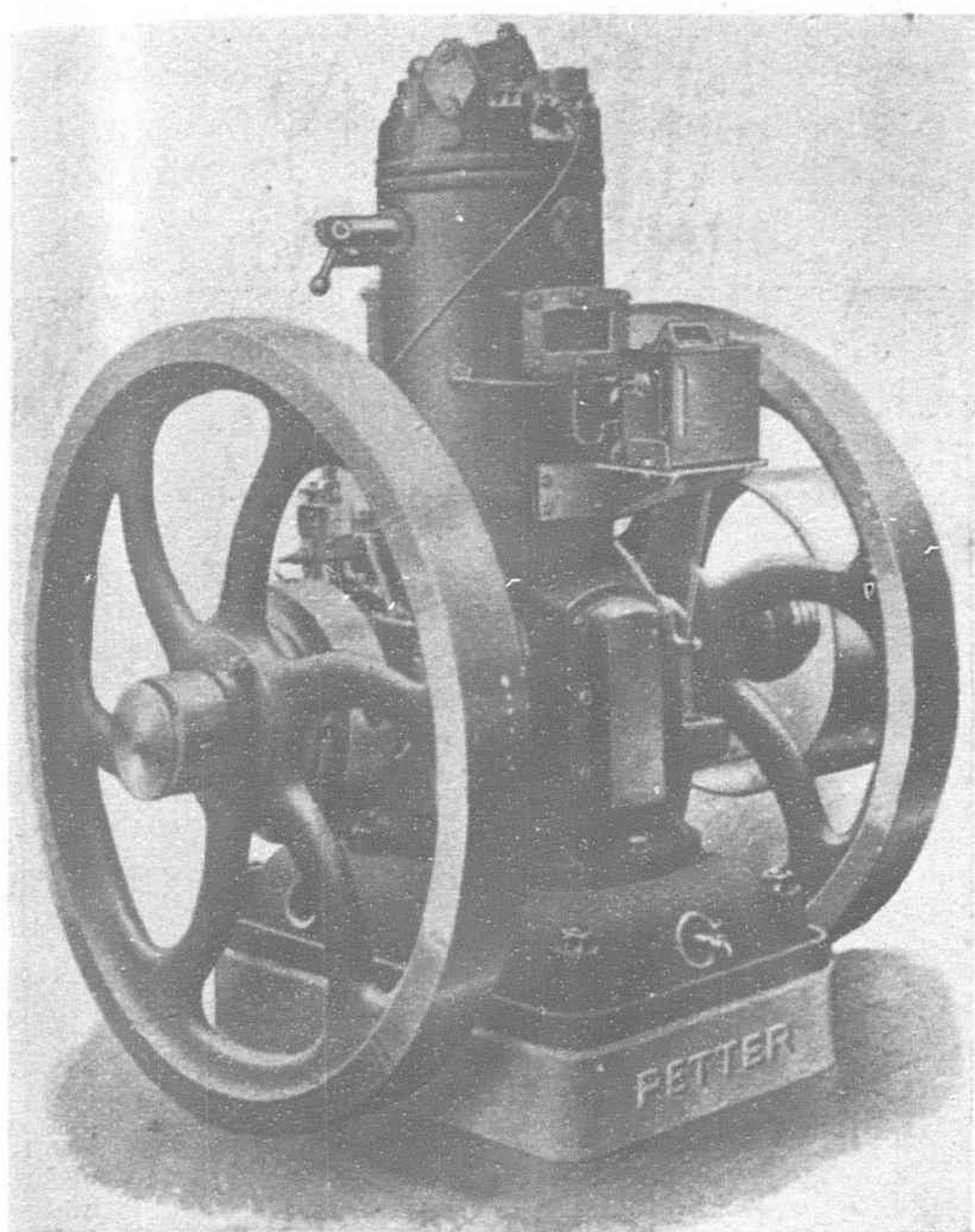


Chart Showing Fuel Consumption of a 40 B.H.P. Petter Atomic Diesel Engine



The Auto-Petter-Light Electric Lighting Plant



18 B.H.P. Petter Surface Ignition Oil Engine

can be really successful. Huge additions have recently been made to an already enormous factory for the employment of a still greater number of workers which it has been found necessary to engage to cope with the ever increasing demand for the product which intensive advertising and salesmanship, in addition to the quality of the product, have created.

Visitors to the

town of Yeovil have often conjectured what it would be like but for the activities of the firm of Petters Limited.

The Petter Engines are manufactured in sizes from $1\frac{1}{2}$ to 260 Horse Power for industrial, agricultural and marine purposes.

The latest engines placed by them on the market are of the high compression, airless and springless injection, Diesel type, which they have termed "Atomic Diesel." These are the result of experiments and tests extending over several years, and will, it is believed, meet the demand for an oil engine possessing Diesel efficiency without complications of any kind. The fuel consumption of these engines is remarkably good. The curves shown are representative of the series of engines, and were taken on a 40 B. H. P. single cylinder unit when using standard Diesel fuel oil. The full load consumption is shown to be 0.44 lb/BHP/hr., equivalent to a thermal efficiency of 31.3 per cent. with a fuel of calorific value of 18,500 B.Th.U per lb. It may be said that the Atomic Diesel engines will operate satisfactorily on practically all grades of fuel oil including low grades of furnace oil. The sectional illustration shows the extremely simple design of this engine. Being without valves and valve operating gear, injection air compressor and other complicated devices, the cost of maintenance is kept to a minimum, whilst the smooth running (due to the perfected two-stroke cycle) and large output for its size, render it a most admirable power unit for all industrial as well as marine purposes. The principle of operations of the Atomic Diesel engine is briefly as follows:—

On the upstroke of the piston air is compressed in the cylinder to a pressure of approximately 450 lbs. per square inch. By this compression a temperature is obtained sufficient to ignite the fuel, the injection of which begins just before the piston reaches top dead center. When the piston has nearly reached the bottom of its stroke, the scavenge ports in the cylinder wall are uncovered and the exhaust gases escape to atmosphere. Immediately after, the air inlet ports are uncovered, and air which has been compressed in the crankcase to a pressure of approximately 4 lbs. per sq. inch is admitted to the cylinder, and this drives before it the last remaining products of combustion. The piston then begins again its upward stroke; the air is again compressed, and the cycle of operations continues as before.

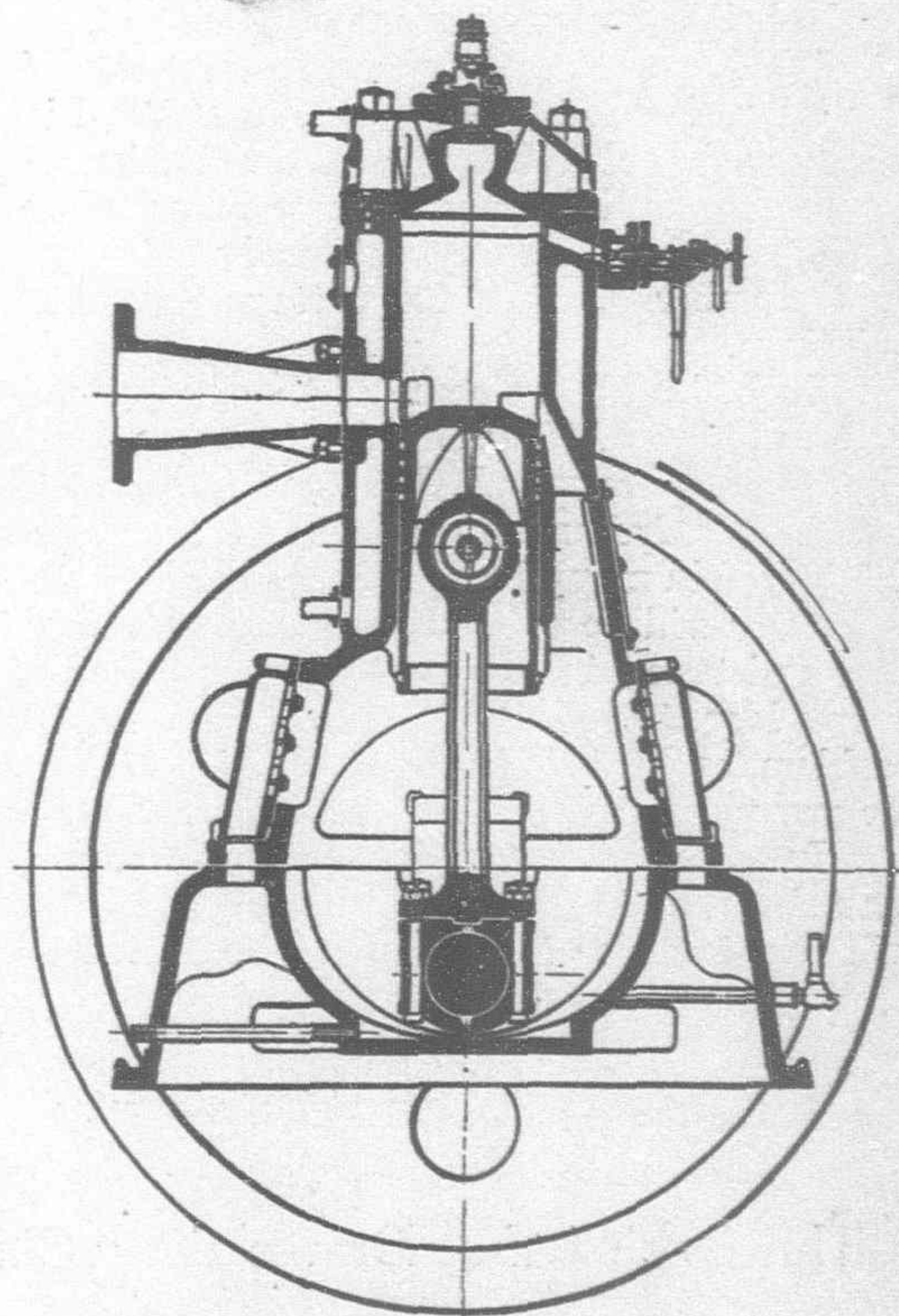
Perfect combustion of the fuel (achieved by the use of a special design of the combustion chamber) is responsible for the high efficiency of the Petter Atomic Diesel Engine. During the latter portion of the compression stroke a considerable degree of turbulence is obtained, and the fuel oil which is mechanically injected into the combustion chamber in the form of a mist or atomised spray of very finely divided particles, meets the turbulent air and intimate mixture results. Ignition, as stated above, is caused by the temperature due to the compression pressure.

The airless injection of the fuel supply further simplifies the design by obviating the use of a high pressure air compressor with all the attendant complications of intercoolers, receivers, valves and piping. A simple fuel pump is all that is needed, and no skilled attention is required as with high blast pressure air injection systems. The elimination of the air compressor therefore adds some 5 per cent. to the mechanical efficiency of the engine. By the employment of crankcase scavenging the use of air pumps is avoided, and the number of working parts kept to an absolute minimum. Special crankcase sealing rings are fitted, thus securing very low lubricating oil consumption.

Of quite a different sphere of usefulness is another recent product of the firm of Messrs. Petters Limited. This is the Auto-Petter-Light Electric Lighting Plant without storage batteries, manufactured in three convenient sizes to supply electric current at 110 volts, being particularly suitable for summer houses, bungalows, shooting-boxes and residences which are only occupied during a period of the year, and for churches, public halls, shops and other purposes where light is required for relatively short hours, or where storage batteries would be liable to be out of use, and possibly be unattended for long periods.

The public are well acquainted with the uses of automatic electric lighting plants which have been marketed for some years, and also, unfortunately, with some of their disadvantages. In designing the Auto-Petter-Light Plant the manufacturers have been careful to avoid all unnecessary complications, fully appreciating the fact that the users of these plants as a rule have no acquaintance whatever with mechanical or electrical engineering, and consequently require a plant that in the first place is not likely to get out of order, and secondly if it should do so, can easily be put right. Such a plant is the Auto-Petter-Light. It consists of a smooth-running Petter petrol engine working on the perfected patent two-stroke cycle with magneto ignition, to which is direct coupled an efficient compound wound dynamo for generating electric current. The engine is fitted with a simple self-starter which operates exactly like the self-starter of an automobile. The act of pressing a switch in any part of the house starts the engine, and a supply of electricity is instantly available. The speed of the engine is controlled by a centrifugal governor which regulates the consumption of petrol in proportion with the number of lights in use. When current is no longer required a touch of the switch in the house stops the engine. The switch can be locked up to prevent unauthorized tampering. Everything is of simple and straightforward construction on approved electrical lines and easily understood by any electrical engineer. Except for the small electric battery of the car-starting type, the use of storage batteries is dispensed with altogether. The regular motion of the Petter two-stroke engine produces a steady light. The engine and dynamo are separate units joined together with a flexible coupling so that the dynamo can be removed for repair when required.

Petters Ltd., also manufacture a series of engines known as S type or Surface Ignition engines in which ignition is obtained by means of a hot surface in the



A Sectional Illustration of the Petter Atomic Diesel Engine

vaporiser. A very ingenious device has been invented by Petters Limited for the purpose of obviating what was previously a drawback to engines of this type, namely, the blow lamp which was necessary for starting. The method of starting by means of the blow lamp was a tedious and expensive one, necessitating engines being run idle for periods such as dinner times, etc., to avoid having to re-start the engine. Such disadvantages do not exist in the Petter surface ignition engines, as, by means of the Petter Patent Cold Starter they start instantly at any time without pre-heating and without electric ignition on the same fuel as is used for running, viz., crude fuel oil or paraffin (kerosene). This invention which was awarded the Silver Medal of the Royal Agricultural Society of England in 1923 is thus referred to in the report of the judges of machinery:—

“By this simple invention a crude oil engine is placed almost on a par with a petrol engine so far as ease in starting is concerned.”

The cold starter consists of a small paper tube containing a substance which when placed in the holder, ignited and placed in the vaporiser, burns with a fierce heat and ignites the first charges of the fuel which are sprayed on to it, so that by the time the cold starter is burnt out the vaporiser has become sufficiently heated to carry on combustion. The engines can thus be started and stopped at any time without expense or trouble, thus effecting considerable economies. This series is manufactured both for marine and industrial purposes in sizes 5, 8, 12 and 18 B.H.P. (single cylinder) and 24, and 36 B.H.P. (twin cylinders).

Another range of engines of the surface ignition type is known as the NL type. These are primarily marine engines, being manufactured in multiple cylinder units of 9 H.P. per cylinder, in sizes 18, 27, 36 B.H.P. They are very suitable for installation in craft of lighter construction on account of the small drop from the shaft line to the engine bearers. They are also largely used for industrial purposes.

Smaller units manufactured by this firm are the M (Magneto) type, in sizes 1½, 3 and 5 B.H.P., stationary, semi-portable and portable. They work on petrol or paraffin with great economy, and are used for electric lighting purposes, pumping water, etc. for contractors and all purposes. They are water cooled on the thermo syphon system, water cooling tanks being provided.

In addition the firm manufacture the Universal engines of the same sizes, for working on the same fuels. These have extra large water hoppers on the cylinder heads instead of water cooling tanks, and are very much in demand where required for moving from place to place, being very compact units indeed.

We have referred to the Auto-Petter-Light Plant. The firm also manufacture the renowned Petter-Light Electric Lighting Plants with and without storage batteries for the lighting of farm, home, shop and factory. Many thousands are in use in all parts of the world. They are extremely efficient plants, and are made in a number of sizes for cottage or mansion, public halls and buildings.

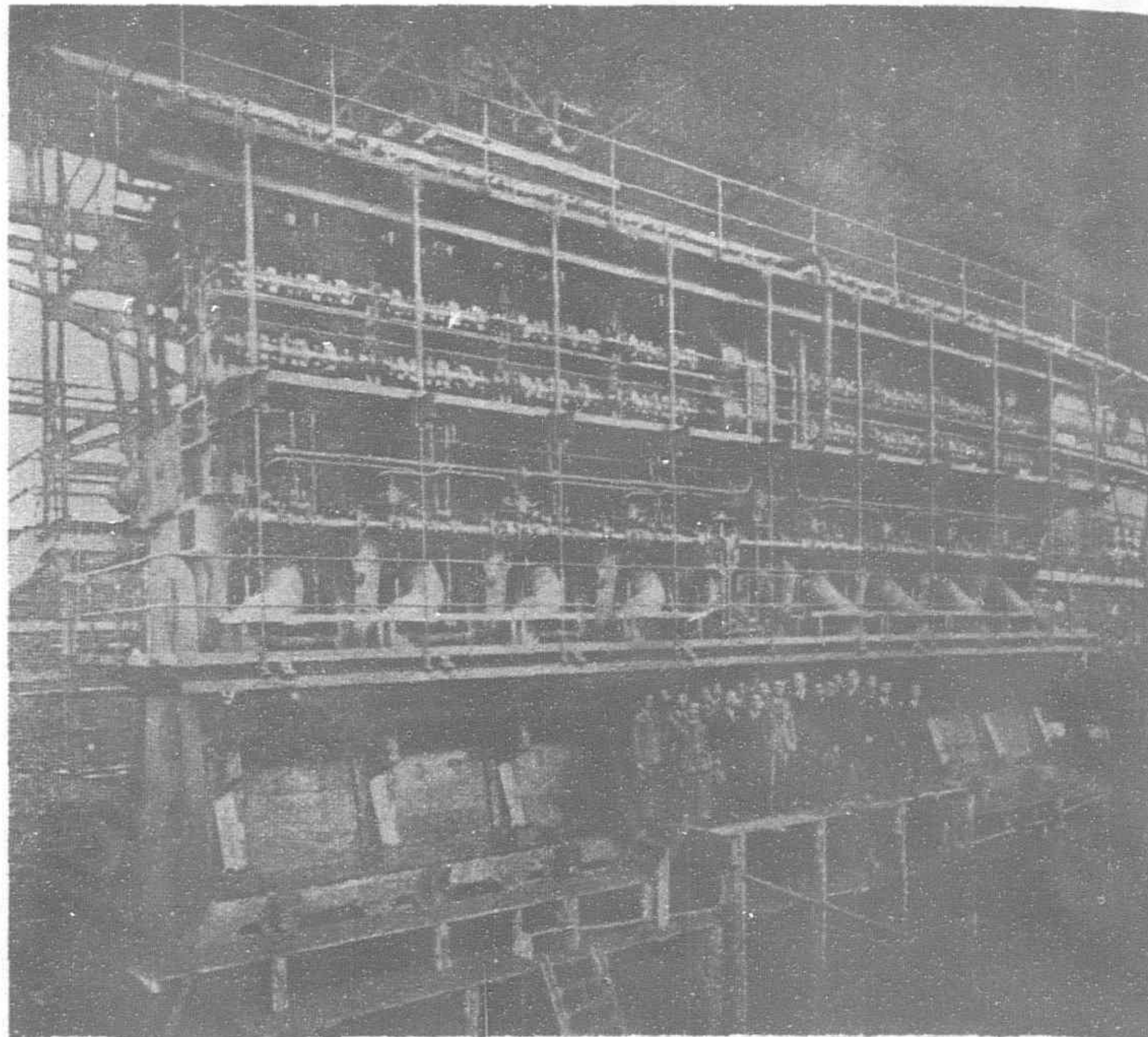
Such, briefly are some of the engines manufactured by Messrs. Petters Limited. The descriptions do not exhaust the entire range. The engines are supplied in combination with machinery of every description for use in all industries. These are described in catalogues in many languages, and Messrs. Petters Limited intimate that they will be very pleased to supply any information and give any assistance in connection with installation of power. They have a large technical department capable of dealing with any power problem, and this is freely at the disposal of all interested in power for any purpose whatever, either on land or on sea.

In conclusion, it may be mentioned that Petters Limited manufacture aircraft for both civil and military purposes, and this will be referred to in a separate article at a later date.

The Engine that Drives the “Chichibu Maru”

Tremendous force that will drive the *Chichibu Maru*, the super motor liner being built at a cost of near \$6,000,000 by the Yokohama Dock Company for Nippon Yusen Kaisha, back and forth

on the trans-Pacific line, is typified by the accompanying photograph of its Diesel engine. The photo was taken at the Burmeister and Wain Works in Copenhagen. The liner will have two sets of these engines to develop 20,000 horse-power. Comparison of



Diesel Engine for the “Chichibu Maru”

the size of the engine and the men grouped on the platform graphically emphasizes the dimensions of the engine and gives an idea of the power that will send the liner coursing through the seas.

A 150,000 H.P. Power Station

This illustration will remind readers that “English Electric” Power Station Plant is not restricted to Steam Turbine driven sets. It is reproduced from a photograph just received from India and shows the completed erection in the Bhira Station of the Tata Power Company, of Five 30,000 H.P. Twin Impulse Water Turbines manufactured at Rugby, with alternators manufactured at Preston.



Bhira Hydro-electric Station, India

Engineering Notes

ELECTRIC LIGHT, POWER AND TRACTION

CHOSEN SUIRYOKU DENKI K.K. (Korea Hydro-electric Power Co.).—With the completion of the Tsutsui Power Plant this company's "first term of construction" came to an end.

The second term of construction provided for the building of the Shoko Power Plant, but it is now reported that due to the company's sound financial backing, a Rayon company with a capital of Y.10,000,000 will be built as well.

The Power Station at Shokori is to be completed in June this year. It was built to supply power to the Chosen Nitrogenous Fertilizer Co.'s mills. The chief feature of this plant is that the water supply is obtained by damming one of the tributaries of the Yalu River and forming it to run backwards. This plant has already been equipped with four 36,000 k.v.a. horizontal type generator. Two more power plants are now under construction as part of the "second term" of construction work. They are situated below the first plant, the second plant having an effective head of 700 feet, the third of 300 feet.

The machine equipment of these power plants has been the center of interest to makers all over the country. At the first plant, the rotary converters and switchboards were manufactured by Siemens: the transformers by Shibaura Engineering Works. But at the second plant the equipment is reversed. Shibaura makes the rotary converters, and turbines, and two generators of 23,000 k.v.a. 450 r.p.m., 60 cycles, the automatic starters and brakes. The transformers are being made by Siemens.

In the third plant, which is automatic, the turbines and one generator of 20,000 k.v.a., 275 r.p.m., 60 cycles, vertical type and automatic switchboards have been ordered from Shibaura.

RAILWAYS

HAILUNG-KIRIN RAILWAY COMPLETED.—The new Hailung-Kirin railway in Manchuria is now completed and through traffic commenced on May 15. On that day the last section, from Kirin to Chaoyangchin was formally opened, this last section being 174 kilometres long.

NANKING'S RAILWAY PROJECTS.—Two reconnaissance parties are being sent out by the Ministry of Railways—one for the proposed Yunnan-Changsha line headed by Chou Liang-ching, and the other for the proposed Yunnan-Canton line headed by Li Yao-ching. Mr. Chou is a technical expert of the Ministry and has been with the Paotao-Ninghsia Railway.

Two other parties are being sent out by the Ministry to conduct an economic investigation in various provinces through which new railways will run.

The first party consisting of four technical experts headed by J. H. Ling is covering Fukien, Hunan and Kiangsi provinces, where lines are projected between Nanking-Canton Foochow-Nanchang, and Shiuchow-Nanchang.

The second party of technical experts headed by Chang Fu-chuan is en route for Yunnan, Kuangsi and Szechuan provinces, through which lines are projected between Canton-Yunnan, Changsha-Yunnan, Liuchow-Chungking, and Pao-ching-Chinchow.

These two parties are to study the economic functions and revenue-earning possibilities of the lines. The investigators have all undergone intensive training at the Ministry for the tasks they have been allotted, and has been given a special course at the Central University here on agricultural economics. Mr. Chang Fu-chuan is a mining engineer and geologist and was specially appointed to head the second party in view of the rich mineral products in the Yunnan-Kuangsi-Szechuan regions.

NEW JAPANESE RAILWAY LINES TO BE OPENED DURING 1929.—According to the Japanese Department of Railways, the construction estimate of 1929, Y.80,000,000 is distributed as follows:

Distribution of Construction cost for 1929:

Location of local construction office	Amount
Hokkaido	Y. 9,191,484
Morioka	4,698,430
Akita	2,537,028
Nagaoka	8,711,473
Tokyo	6,895,824
Gifu	8,909,316
Yanago	5,765,824
Okayama	6,217,665
Kochi	1,850,625
Yamaguchi	3,114,740
Kumamoto	7,470,942
Atami	24,750

Main Office:

Materials:	7,448,479
Cars etc:	4,161,000
Cost of construction on contract..	2,492,420
Electrification of Joetsu Line: ...	500,000

Total: Y.80,000,000

It is also reported that the line to be opened this year number 41 with a total mileage of 327 miles, as follows:

Location	Mileage	Date of Opening 1929
Marifu—Iwakuni	2.3	April 4,
Hida Kanayama—Yakeishi ...	5.6	" 14,
Niimi—Iwayama	5.2	" 14,
Awa Kamogawa-Kazusa Okitsu	9.7	" 15
Kii Yura—Gobo	5.1	" 21
Higashi Hagi—Nako	7.4	" 21,
Sanuki Takarada—Awa Ikeda .	12.1	" "
Nishitojo—Takarabe	4.2	" "
Sasagawa—Yatagawa	5.3	May
Matsuzaka Gongenmae	4.3	July
Kuniwake Kuniwake Machi ...	1.6	August
Marusefu—Shirataki	12.2	" "
Orikabe—Kesennuma	7.6	" "
Sandai—Aiko	9.5	September
Fukato—Hachimam	5.2	" "
Ecchu Hachi—Sasatsu	5.1	" "
Shinano Omachi—Yanaba ...	7.0	" "
Hyocha—Deshikutsu	15.7	" "
Shari—Fudatsuru	12.2	October
Takadomari—Horokanai ...	10.2	" "
Ajigasawa—Akaishi	4.0	" "
Araya Shinmachi—Tayama ...	7.3	" "
Obihiro—Nakahoronai... ..	17.5	November
Kamikawa—Nakakoshi	7.6	" "
Harada—Chikuzen Uchino ...	9.2	" "
Kuninui—Chikobe	10.3	" "
Kohato—Furuichi	2.5	" "
Ohara—Otaki	9.9	" "
Bingo Nakamura—Mori	6.2	" "
Tomakomai—Saruta	25.9	December
Gongenmae—Izeki	5.4	" "
Toyooka—Kumihama	7.4	" "
Hizen Yamaguchi—Ryuo	6.1	" "
Gunke—Hayabusa	2.8	" "
		1930
Hitachi Taishi—Higashidate .	9.5	January
Rikuchu Yagi—Kuji	13.6	March
Mihara—Sunami	3.2	" "
Kisarazu—Kururi	14.1	" "
Iyō Matsuyama—Gunchu ...	7.2	" "
Imari—Yamashiro	3.5	" "
Bicchu Kamishiro—Yagami ...	6.2	" "

ELECTRIC RAILWAY TO OSAKA.—The long-discussed plan for a highspeed electric railway between Tokyo and Osaka, has reached the point where formal application for permission to construct it has been filed with the Government Railways Department, according to the Osaka Mainichi. The line is to be completed within five years from the date formal permission is obtained.

It is proposed to reduce the time of the trip from Tokyo to Osaka to six hours by means of the electric line. Powerful electric locomotives, capable of doing 50 miles an hour, will be used on a broader gauge track measuring 4.85 feet in width. Terminal stations will be constructed at Shibuyamachi in Tokyo and Noemachi in Osaka with intermediate stations in Nishi, Yokohama, Gotemba, Shizuoka, Kita Hamamatsu, Okazaki, Nagoya Kameyamachi and Kita Nara.

The project is being handled by a specially organized company including 300 prominent business men of Tokyo, Osaka, Nogoya, Yokohama and other cities in the Tokaido. The organization is capitalized at Y.250,000,000. Prefectural authorities in all of the Prefectures through which the line will pass are said to have given the necessary approval to the scheme.

INDUSTRIAL

JAPAN PARAFFIN CO., LTD.—The S. M. R. Co.'s new venture in the shape of the paraffin factory located on the premises of the Asahi Petroleum Co. (about 70,000 tsubo) in Oshima Peninsula opposite the town of Tokuyama, Suo Province, Yamaguchi Prefecture, near Shimonoseki, the shares of the new Company have been paid up in full, and the founders' general meeting is to be held shortly.

The Company will be styled the Japan Paraffin Co., Ltd., with the capital of Y.2,000,000 in addition to Y.1,300,000 loaned by the S. M. R. Co. All the shares have been taken up by the Railway Co.

The Directorate comprises Sales Superintendent Ogawa of the S. M. R. Co. and Dr. Katayama in the service of the Fushun Collieries, and Messrs. Mizutani and Honda, both in Tokyo.

Efficiency Chief Mukaibo and Auditor Kanamaru of the Railway Co.'s General Offices are Auditors.

The old factory will be used subject to major alteration and re-equipment.

The work will begin on May 9, to be finished in half a year. Manufacture of paraffin will commence in November.

According to the plan, the new installation will cost Y.1,700,000. Necessary machinery is ordered from a Czech factory. The new factory will have the floor space of about 1,000 tsubo.

From crude paraffin of 15,000 tons to be supplied by the Oil Shale Factory, Fushun, 7,500 tons heavy oil and 6,600 tons paraffin will be put out. As the Fushun Factory extends its scale of operation, the paraffin factory, too, will be correspondingly enlarged.

MITSUBISHI TO ESTABLISH RAYON COMPANY.—It is reported that the Mitsubishi interests have been interested in Rayon for some time, and looking for a favorable opportunity to establish a new company.

The present report is that a new company to be called the Nippon "Berberg" Kenshi K.K. (Japan "Berberg" Rayon Co., Ltd.) will be established with a capital of Y.10,000,000, as a subsidiary to the Nihon Chisso Hiryo K.K., another Mitsubishi affiliation.

The interests involved are Japanese and German.

In 1928 the total production of rayon is given as 16,900,000 pounds. The total authorized capital of all companies producing rayon as Y.87,000,000.

Experts say that the Japanese Textile industry has not yet used rayon as raw material up to a total of one per cent. of all raw materials used. The industry can easily bear 10 per cent. though the changes will work hardships on cotton and silk possibly. The Japanese taste like that of the Occident is slowly turning toward the present fashions regardless of their durability, and therefore rayon has its chance to advance in Japanese.

NIHON CHISSO HIRYO K.K.—(Japan Nitrogen Fertilizer Co., Ltd.) Experiments of the Nenryo Kenkyujo (Fuel Laboratory) have shown it is possible to liquefy one ton of raw oil from two tons of brown coal produced in Kankyo Hokudo, in Korea. (Price of this brown coal, average about Y.3.50 per ton).

The Nihon Chisso Hiryo K.K. has decided to enter into this enterprise in Korea and has ordered the necessary machines from foreign manufacturers. The budget of the company is estimated at some one million yen. The whole equipment is to be installed by the autumn of next year (1930).

If the attempt of this company succeed, the liquefaction of brown coal will be a good business in Japan as well as in Korea, because there are many fields producing the same kind of coal in Ibaraki Prefecture and the Hokkaido.

SOUTH MANCHURIA RAILWAY MAGNESITE MILL.—The South Manchuria Railway Co., Ltd. has discovered a magnesite ore which is lighter than aluminum. According to experiments tried, it requires about 30,000 k.w.h. of electric power to refine one ton of pure magnesite from raw ore.

At present the company has not enough electric power to use for refining magnesite ore, though there are still considerable power resources yet undeveloped. The company is therefore planning to import these ores to Japan for refining there, because there is a large surplus of power in Japan and many companies are finding it difficult to dispose of their surplus.

Magnesite is now quoted at Y.2,000 a ton, while aluminum is about Y.1,000 a ton.

GLASS FACTORY AT WAICHOW.—A wealthy merchant of Waichow is the prime mover in a scheme to establish a factory in Ngao Tau, of the Waichow district for the manufacture of glass products. In this district there is a lake known as the Pak Sha Lake (White Sand Lake) containing sand of a quality eminently suitable for glass making, and it is said that a picul of this sand will produce 90 catties of glass. There are three firms in Waichow engaged in the business of recovering the sand from the lake and exporting it to other districts for glass manufacturing but there are no glassworks actually in this vicinity and the present proposal is the first to be made to establish the industry here.

Influential merchants of both Hongkong and Canton are interested in this scheme and the necessary financial backing is practically assured. The promoter of the scheme plans to proceed to Australia, when this project has assumed more definite shape, to study and learn the latest methods of vitrification. It is also learned that Chinese abroad are also interested in this proposition and numerous enquiries have been received concerning the flotation of company.

A MOTOR ASSEMBLY PLANT.—Plans were announced by officials of the General Motors Co., for the proposed opening of a large motor car assembly plant in Shanghai that will have a marked effect on the local situation and a definite bearing on future industrial opportunities in Eastern China.

The actual opening, they said, only awaits a more favorable outlook on the motor car industry by Nanking than is indicated by the present duty of 22 per cent. imposed on un-assembled motor cars and 12 per cent. on the assembled product entering this country.

The company has already secured plant facilities having taken over the old N.Y.K. property on Yangtszepoo Road and the employment of several hundred Chinese awaits the review of the present tariff by Nanking, which officials of the American company are optimistic enough to believe will result in a reduction.

PUBLIC WORKS

THE HAIHO CONSERVANCY SCHEME.—Of the conservancy problems that confront the National Construction Commission at Nan-

king, the shoaling of the Haiho is the most pressing. The waterway from Tientsin to the sea must be kept navigable. Hence the dredging of the Haiho. The Yungtingho, a tributary of Haiho, merits equal attention. Tientsin and the lower Chihli district will be inundated unless something drastic is done in the way of flood control. The defunct Peiping administration did place the Haiho conservancy job in the hands of a commission known as the Chihli River Commission but nothing worthy of attention was done. And this Commission has given way to the North China River Commission which is a branch of the National Construction Commission. It is the duty of the Commission to design and execute all hydraulic improvements in North China. Extensive programs of reconstruction including flood control work, river conservancy problems, irrigation schemes, harbour development, etc. have been mapped out. As soon as funds are available, the plans will be put into execution in the order of their respective importance. A sister organization known as the Hopei Commission for the Improvement of the Haiho was instituted by the Chairman of the Provincial Council and the Mayor of Greater Tientsin who were principally responsible for getting the Bill for floating debentures to the amount of four million dollars railroad through the Legislative Division of the National Government. The whole scheme has met with official sanction. The Administrative Council of the Central Government, in compliance with the decision of the Legislative Yuan, resolved, at a meeting that the National Construction Commission be asked to assist in such provincial development projects. The North China River Conservancy Commission was organized with that in view.

Much inconvenience has resulted from the fact that owing to the Yungtingho being virtually saturated with silt-bearing water all steamers with Tientsin as the port of destination have been held up at Tongkukow. It is the cherished wish of the aforesaid Commission to so dredge the Yungtingho as to divert its muddy waters to Tahotien and thence to the sea through the Chinchungho. The engineers of the River Commission appointed by the erstwhile Peking crowd had in mind the construction of a detention reservoir at Kuanting. and Tahotien was to be converted into a silting basin. As no funds had been ear-marked for this vast project, this admirable scheme was simply allowed to fade away. The plans as prepared by the former Commission were not concrete enough, the drawings being superficial rather than substantial.

That the lower course of the Yungtingho is subject to periodic inundations needs little explanation as the dykes erected frequently gave way when flood was at its peak. In order to minimize the danger of flooding, the present Commission is prepared to do everything possible to bring to reasonable control its turbulent waters. The Peiyunggho channel from Chuchien to Pei-tsang will be deepened so that the passage between the two will remain unblocked. A ship lock will be built at Pei-tsang with a view to placing the waterborne traffic between Tientsin and Tungchow under systematic control. A canal linking together Pei-tsang and Tahotien helps in a significant degree to accommodate the surplus water in the event of the Yungtingho delta being filled to its maximum capacity.

As to the cost of the system, four million dollars has been set apart for the project. This estimate does not include the Kuanting job. Adequately prosecuted, this job alone calls for a provision of little over a million a part of which will go for the purchase of land. The item of land cost may be boiled down a good deal when we are given to understand that for such condemnation proceedings the Government is fully justified in exercising its power of eminent domain. The proposed basin at Kuanting would be about 20 square kilometres in size, and the Commission would want to have it located about 120 kilometres north of Peiping. The dam to be thrown across the Yungtingho will have a base 68 metres long and its height will be in the neighborhood of 25 metres.

As regards the issue of the loan, the bankers as well as the Government will leave no stone unturned in their effort to raise funds for the materialization of this worthy undertaking in the interest of humanity.

Regulations Governing the Issuance of the Haiho Conservancy Bonds

The following is a translation of the regulations governing the Haiho Conservancy Bonds promulgated by the National Government on April 17, 1929:

Art. 1. The Bonds shall be known as the Hopei Province Haiho Conservancy Short Term Bonds.

Art. 2. The Bonds shall be issued by the Ministry of Finance, Executive Yuan, National Government of the Republic of China, and shall be collected by the Haiho Conservancy Board, Hopei province.

Art. 3. The total amount of the Bonds shall be fixed at \$4,000,000.

Art. 4. The Bonds shall be exclusively used to meet the expenses involved in the dredging of Haiho, Hopei province, and the buying of alluvial lands along the river banks.

Art. 5. The Bonds shall bear 8 per cent. interest per annum.

Art. 6. The Bonds shall be issued at par value.

Art. 7. The date of issue shall be April 16, 1929.

Art. 8. The interest for the period ending October 15, 1929, shall be deducted in advance.

Art. 9. Payments of interest and principal shall be made on April 15 and October 15, while the dates for public drawings shall fall on April 1 and October 1. Five per cent. of the total issue shall be drawn at each time until the entire issue repaid on April 15, 1939.

Art. 10. The Bonds shall be secured on the entire amount of the new 5 per cent. surtax levied by the Tientsin Customs House on all articles which are originally subject to 5 per cent. *ad valorem* duty. The new surtax shall be collected upon order from the Ministry of Finance, beginning from April 20, 1929.

Art. 11. The Inspector of the Tientsin Customs shall deposit the assigned funds with the 2½ per cent. Treasury Bonds Sinking Fund Committee for custody; the Central Bank, the Bank of China and the Bank of Communications of Peiping and Tientsin respectively shall be appointed as the authorized organs for payment of interest and principal.

Art. 12. The Bank of China, the Bank of Communications, the Yienyieh Commercial Bank, the Continental Bank, the Kinchen Banking Corporation, the China and South Sea Bank, and other financial institutions of Peiping and Tientsin respectively shall be appointed as the authorized organs for the issuing of Bonds. Before the printing of Bonds is completed, tentative receipts, bearing the amount of Bonds subscribed and the amount of money paid, shall be issued by the Bank of China and the Bank of Communications to the subscribers, and official Bonds shall be later exchanged in the same banks upon presentation of the receipts.

Art. 13. The denominations of the Bonds shall be \$10,000 and \$1,000.

Art. 14. The Bonds shall be of the "bearer" kind.

Art. 15. The Bonds may be freely bought, sold or mortgaged, and they may be used as fiduciary reserve of banks or as security in Government Service in cases where security or guaranty is required.

Art. 16. Those who have committed the acts of forging or discrediting the Bonds shall be duly punished.

Art. 17. The present regulations shall come into effect on date of promulgation.

SHIPPING AND SHIPBUILDING

N.Y.K. SERVICE TO NEAR EAST.—The N.Y.K. announce the inauguration of a direct service to Smyrna, Constantinople and Piraeus with their Liverpool liners, the new departure to commence with the Dakar Maru sailing on June 11.

They have eight sailings a year—practically monthly, excepting the Hankow direct loading season during which period the service will be alternate months.

On the return voyage, steamers will be berthed at Piraeus and Alexandria—this from July.

The newly-opened service should do much to promote trade between Shanghai and these near Eastern ports.

SHIPBUILDING.—The shipbuilding industry in Japan has assumed a remarkable activity since last year; especially, since the beginning of this year the number of vessels completed has been gradually increasing as shown in the following table:

January, 1929:

Under construction:	5 vessels,	156,061 tons
Launched:	5 "	1,906 "
Completed:	2 "	1,823 "

February, 1929:

Under construction:	49 "	159,705 "
Launched:	9 "	10,982 "
Completed:	11 "	11,606 "

March, 1929:

Under construction:	49 "	165,105 "
Launched:	16 "	26,788 "
Completed:	2 "	21,212 "

BUILDING

MARUNOUCHI NEW BUILDING.—The Marunouchi has taken another step toward the complete Westernization of the district with the addition of the new Teikoku Life Insurance Company Building, erected near Tokyo Station at a cost of ¥2,400,000.

The new building is a reinforced concrete structure of eight stories. The building was designed by Dr. Kotaro Sakurai, who planned the main office building of the Mitsubishi Bank. Dr. Sakurai took care that the building should service the practical purposes of the insurance business and at the same time be in harmony with

the other buildings under construction in the neighborhood such as the Daiichi Bank and the Ministry of Railways.

The lot on which the insurance building is erected is about 683 tsubo, of which 460 tsubo are occupied by the new building. The total floor area of the building is 3,494 tsubo, or about three acres. The exterior of the building is of artificial stone of a light tan color.

The building is absolutely secure against fire and earthquake. All the windows are equipped with wire glass, and those facing the next building have steel roller shutters which are automatically operated. Each floor is provided with special fire prevention equipment. To provide for emergency, there is a deep well in the basement, which yields 40,000 gallons of water in 24 hours. A special arrangement is made to draw this water to the top of the building in the event the city water supply system fails to operate properly at the time of emergency.

The security of the building against earthquake is one of the features of the building, according to the architect. As a general rule the Marunouchi district has to be dug from 70 to 80 feet in order to reach a hard stratum as the foundation for buildings. In the instance of the new insurance building it was not necessary to dig more than 33 feet to find hard pan.

MOTOR CARS

BIG MOTOR CONTRACT FROM NANKING.—The contract for the biggest single motor deal was awarded to two local American firms, Shanghai. Messrs. Honigsberg & Co. and the China Motors, Fed. Inc., U.S.A. have contracted to supply the Nationalist Government

with 250 trucks each, the first firm will supply General Motors Corporation one and a half ton trucks, while the latter firm will supply trucks of one ton capacity. The bodies will be built locally and will be patterned after the Karrier trucks used by the British Army. The total price, including accessories, spare parts, oil and gasoline is Tls. 1,700,000, the cost of the trucks alone being Tls. 1,200,000.

MINING

KARAFUTO KOGYO K.K.—(Karafuto Industrial Co., Ltd.) Karafuto Kogyo K.K. (one of the Okawa-Tanaka concerns, which manufactures foreign paper) has decided to increase the output of coal at Taihei and Taiei Mines in Karafuto from the present 250,000 tons a year to some 400,000 tons a year. At present all the output is used by its factories, but in future the increased production will be sold in the open market. It is reported that these coal mines have deposits amounting to 50,000,000 tons.

AVIATION

A NEW JAPANESE AIR TRANSPORT COMPANY.—The Japan Air Transport Company was organized in Tokyo in November, 1928, with a capital of ¥1,000,000.

Its active operations will begin in April with an air line from Tokyo to Osaka and Fukuoka, thence across the Straits of Korea to Seoul and Dairen, a total distance of 1,300 miles. Between Tokyo and Fukuoka a weekly schedule

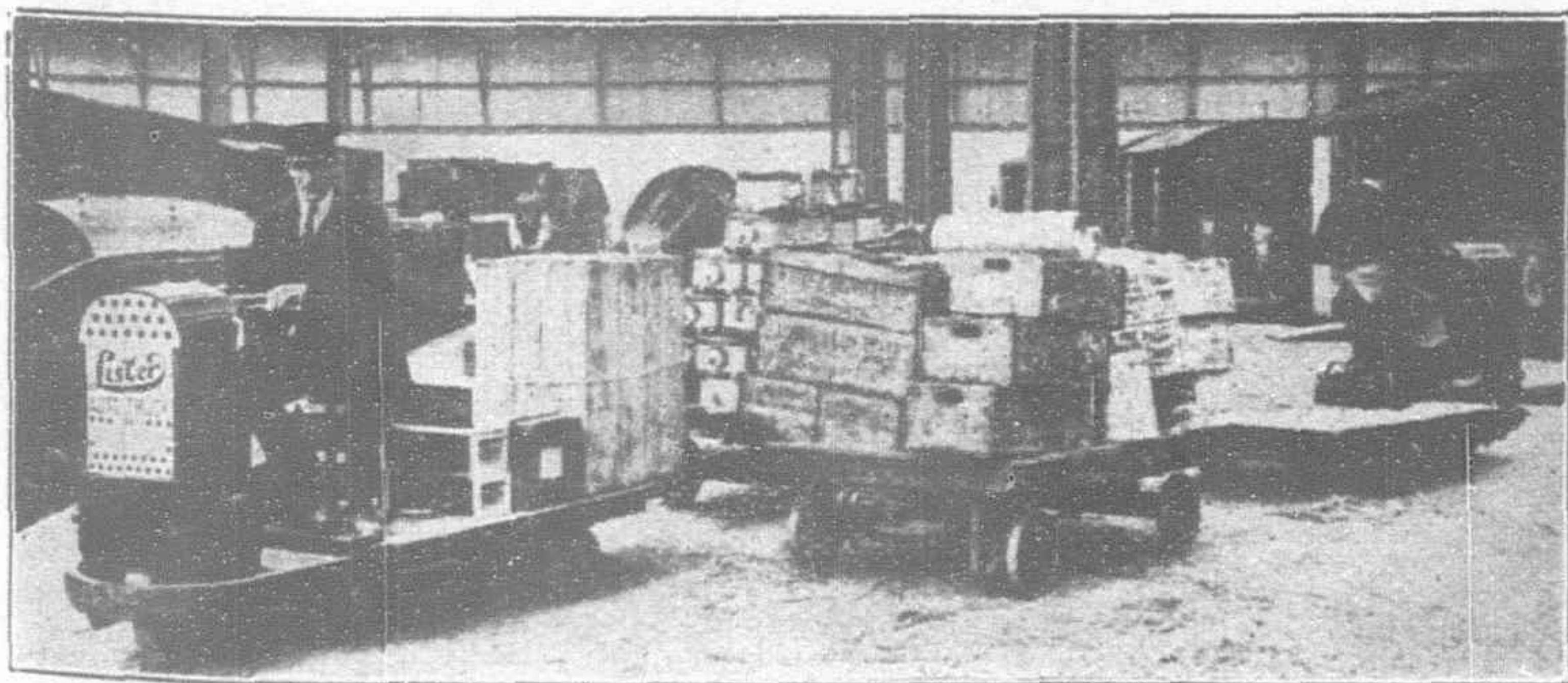
*Great Western Railway
*London Midland & Scottish Railway.
*London & North Eastern Railway.
*Southern Railway.
Great Northern Railway of Ireland.
South African Railway & Harbours.
International Railway of Central America, San Salvador.
Colombia Railway & Navigation Co.
Buenos Aires Western Railway Co.
Buenos Aires & Pacific Railway Co.
Cordoba Central Railway Co., Rosario.
Central Uruguay Railway of Montevideo.
Imperial Japanese State Railway.
Royal State Railways of Siam, Bangkok.
San Paulo Railway Co., Brazil.
Royal Dutch State Railways.
New South Wales Government Railway.
*Denotes repeat orders.

THESE RAILWAY COMPANIES. HAVE ADOPTED THE AUTO-TRUCK

BECAUSE of speed, manoeuvrability, reliability and economy. The ideal transport vehicle for goods and parcels traffic—unequalled for platform and goods-yard work.

We have Agents and Representatives in all parts of the world; or we will supply full information on request.

R. A. LISTER & CO., LTD., DURSLEY, GLOUCESTERSHIRE, ENGLAND, Est. 1867



Lister Auto Trucks working at the G.W.R. Temple Meads, Bristol Goods Station, England.

THE Lister
PETROL DRIVEN
AUTO-TRUCK
PATENTED HOME AND ABROAD



Industrial

RAILWAY PLANT

for Stone Quarries, Coal Mines, Excavations and Harbour Works, etc.

R. DOLBERG

BERLIN W. 15

Cables: Dolbergius, Berlin

of six trips each way will be maintained, the extension from Fukuoka to Dairen operating only three times weekly each way.

The company has bought six Fokker Super-Universal monoplanes (450 h.p. Bristol Jupiter engines) from the American Fokker Company and six Fokker FVII-3m monoplanes (three 200 h.p. Wright Whirlwind engines) from the Dutch Fokker Company.

The company will operate under a £2,000,000 Government subsidy which will begin in April and will cover a 10-year period. In addition the Government will light the route and supply the meteorological service.

Previous services between Tokyo and Osaka and Osaka and Fukuoka operated by the Tozai-Teiki Kokukwai (Eastern and Western Aviation Co.) and the Nippon Koku Kabushiki Kaika (Japanese Aviation Co. Ltd.) which have been working, rather more than less intermittently, since 1925, will be absorbed by the new concern.

Mitsui and Co. and the Mitsubishi Co., two of the leading industrial banking establishments in Japan, are interested in the new company.

STINSON-DETROIT AEROPLANES.—Another link in China's growing chain of aviation routes was added recently with the arrival in Shanghai of three airmen and four Stinson-Detroit planes to be used by the Ministry of Communications in the proposed commercial and mail enterprise from Shanghai to Nanking and continuing on to Hankow, Ichang, Chungking and Chengtu.

The 'planes they brought out are standard six-passenger types, equipped with the new 300 h.p. Wright engines, and are fitted with baggage and toilet compartments, being similar in all details to the well-known Stinson 'plane "Pride of Detroit." The type of machine was flown

by Messrs. Schlee and Brock of Detroit on their round-the-world trip in 1927, during which they stopped in Shanghai before terminating their trip in Tokyo. It was a result of this "good will" flight that the performance of the Stinson 'plane was noted in China and the purchase of the four machines now was made.

The 'planes were purchased in the United States and the aviators contracted for before they set foot in China. The idea is that they will be used mainly in the training of Chinese for the flying service and will form the nucleus of a training school which Nanking hopes to assemble from aviators who can be brought out here.

AVIATION CORPORATION MANILA.—Reflecting a growing interest in and need for commercial aviation in the Philippines, the Aviation Corporation of the Philippines has been formed here by a group of Americans, Spaniards and Filipinos.

The concern proposes to conduct a passenger, freight and mail business between Manila, Cebu, Iloilo, Zamboanga and Baguio. Cebu, Iloilo and Zamboanga are important ports in the central and southern islands of the archipelago, while Baguio is an important mountain resort north of Manila.

However, before the corporation can engage in business it must obtain the removal or modification of an executive order which virtually prohibits flights by private individuals. The order, issued by the late Governor-General Wood in 1922, provides that there shall be no flying by aircraft other than those of the United States and the Philippine Government at an altitude greater than 50 feet above sea level within a distance of five miles of several strategic points. Many of these strategic points are in or near the only cities where there is any demand for commercial aviation.

The matter will be placed before the Governor-General and it is hoped that he, after obtaining the recommendations of a committee of Army and Navy authorities, will issue a new order liberalizing the present one.

The Army announced some months ago that it would seek to aid the development of commercial aviation in the Islands by building airports which would be open to privately operated aeroplanes.

AVIATION FIELD NEAR SHANGHAI.—It is announced that an aviation field for the accommodation of aeroplanes to be employed in mail and passenger service between Shanghai and Nanking will soon be opened by the Ministry of Communications near Chenju, one station north of the Shanghai-Nanking Railway station in Chapei.

The field will probably be larger than the Hungjao airdrome as besides being big enough as a landing place for aeroplanes, a number of hangars for the accommodation of aeroplanes will also be constructed there.

AIR-LINES TO OPEN UP SIBERIA.—The distance between Moscow and Irkutsk in Siberia, five days by train, can now be done in 35 hours of flying time. The air route has been opened and there will be three planes leaving Moscow for Irkutsk every week. Other distant Siberian points likewise will be made more accessible in the near future by a web of air-lines.

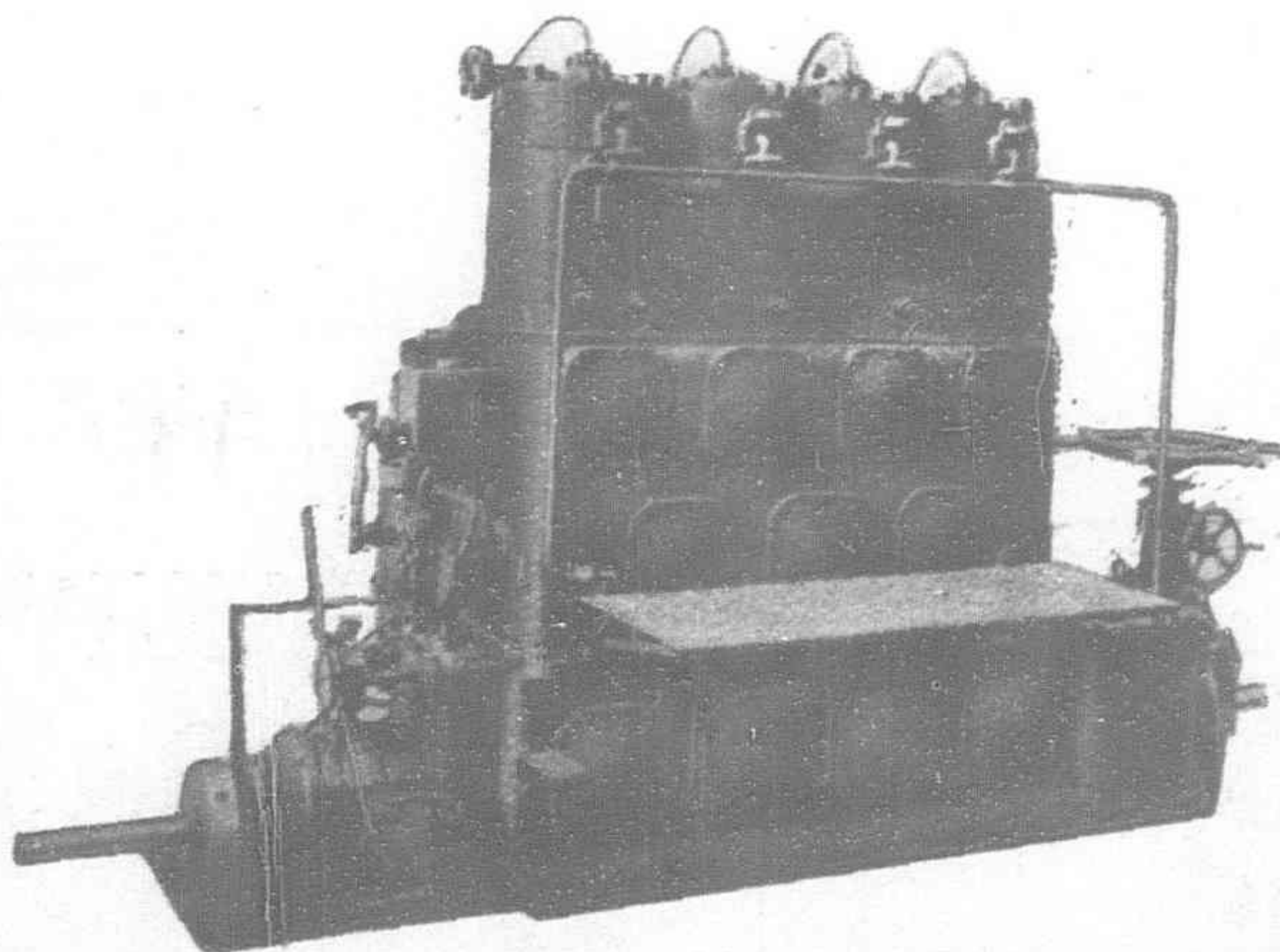
Air connections with the Caucasus have been functioning for several years and this season they have been considerably enlarged. The famous holiday resorts on the Caucasian coast, heretofore at least three days' distance from Moscow by train, can be reached in about 12 hours.

SULZER BROTHERS

SHANGHAI ENGINEERING OFFICE 4 AVENUE EDWARD VII.

Telegraphic Address
"SULZEBROS" SHANGHAI
Telephone 16512

蘇爾壽工程事務所
上海愛多亞路四號
本公司常備樣本供奉各界
垂詢工程事務亦屬誠酬答



Unitlow Steam Engines, Air and Gas Compressors, Upright Watertube Boilers, Cornish and Lancashire Boilers, High and Low Lift Centrifugal Pumps, Fans and Ventilators for all purposes, Fire Engines, STATIONARY AND MARINE DIESEL ENGINES, AIRLESS INJECTION DIESEL ENGINES, Ice-making and Refrigerating Plants, Maag Gears and Maag Planing Machines.

**160-BHP Airless Injection
Two-Cycle
Sulzer Marine Diesel Engine**
With Built-In Reversing
Gear and Thrust Bearing

Special Advantages
Utmost Simplicity
Easy Attendance
Compact Design
Reduced Weight
Extra Low Lubricating Oil
Consumption

WINTERTHUR. SWITZERLAND.